March, 1950

THE FOUNDRY

wherever metals are cast...

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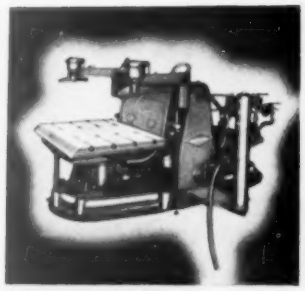
DETROIT

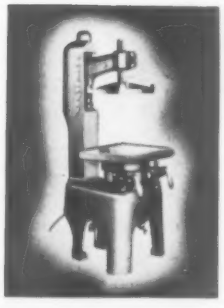
IN THE Spotlight

Jolt Rollover Draw
Model A

"DAVENPORT" FOUNDRY MOLDING MACHINES



Jolt Rollover Draw
Model SA



Jolt Squeeze
Model 10-JX (Stationary)

Jolt Pin Lift
Model AJS (Portable)

A MECHANIZED FOUNDRY BENEFITS EVERYONE

REPRESENTATIVES
CANADA
Canadian Foundry Supplies & Equip. Ltd.
Toronto and Montreal
FRANCE • BELGIUM • LUXEMBURG • SWITZERLAND
Ph. Bonvillain & E. Ronceray, Choisy-Le-Roi
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R. K. Price Associates, Inc.
70 Pine St., New York 5, New York, U. S. A.

DAVENPORT MACHINE AND Foundry Company
DAVENPORT IOWA U. S. A.

WHY *PROGRESSIVE* FOUNDRIES RELY ON...

for

Better Castings

A modern cupola, holding ladle and electric bull ladle installation in Meadow Lands, Pa., plant of American Brake Shoe Co.

Purite is widely accepted as the most economical desulphurizer and cupola flux by progressive foundry operators everywhere. And here are seven good reasons why:

1. **Purite gives 100% fluxing action in the cupola — 100% desulphurizing action in the ladle.**
2. **Purite gets to the iron quicker — no faster desulphurizer made.**
3. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
4. **Purite comes in 2-lb. pigs — no weighing or measuring required.**
5. **Purite is 100% fused soda ash — you do not pay for inert materials.**
6. **Purite does not crumble — no waste — no dust.**
7. **Purite can be shipped in bulk carloads at substantial savings over bag shipments — is easily stored without deterioration.**

These everyday benefits show why Purite enjoys such widespread use as the foremost cupola flux and ladle desulphurizing agent. For full information, write today for literature telling how you can improve your iron with Purite. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

PURITE
100% FUSED SODA ASH
The Scientific Flux for Better Melting and Cleaner Iron

Purite is sold by all leading foundry supply houses in the United States and Canada.

Mathieson
CHEMICALS

81

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALT

NEW... FOR FASTER, EASIER, LOWER COST FINISHING OF GRAY IRON CASTINGS

'NISILOY'*

(NICKEL-SILICON-ALLOY)

● WHAT IT IS

"NISILOY" is an inoculant with positive graphitizing power. It contains about 60% nickel, 30% silicon, balance essentially iron. Its remarkably low melting point of 1800° F. and relatively high specific gravity causes it to dissolve quickly in liquid iron.

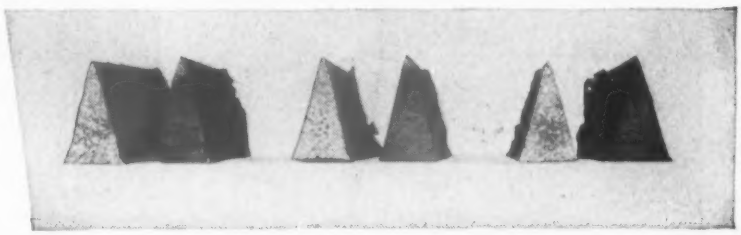
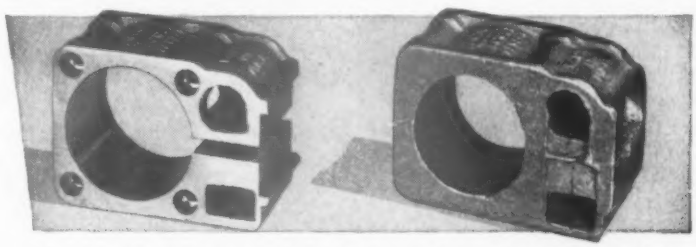


Photo of 1" chill test bars show advantages of Nisiloy. In each pair, wedge on left is white, and was cast without Nisiloy. Right hand wedges used progressively 1 to 1½% Nisiloy. Notice complete elimination of hard white iron on specimen at extreme right.

● WHAT IT DOES

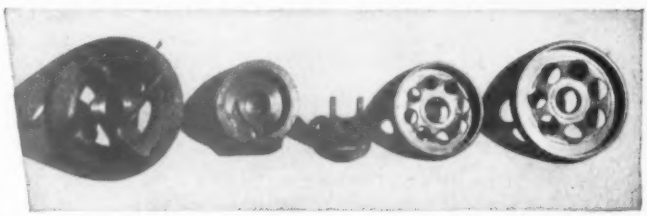
"NISILOY" improves machinability . . . it provides a dense, gray, easy-to-machine structure that reduces machine shop costs.



Use of 1% Nisiloy in these cylinder castings eliminated machining troubles from hard spots in light sections, raised output, reduced rejects and cut final costs.

● HOW TO USE IT

"NISILOY" is simply added to the ladle. Additions of from .25 per cent to 1.00 per cent usually prove sufficient for structure control. Improve quality and quantity of your output. Get full information . . . mail the coupon now.



Nisiloy helps you control properties of gray iron for casting parts with varied cross sections that tend to create chilled surface areas. Its use eliminated machining troubles, and provided a dense, uniform close-grained microstructure in these bonnets, slide valves and bushing.

*Trade Mark of The International Nickel Company, Inc.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses and bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications

THE INTERNATIONAL NICKEL COMPANY, INC.
Dept. TF, 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled,
"NISILOY" for GRAY IRON CASTINGS.

Name..... Title.....

Company.....

Address.....

City..... State.....

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

SIGNS of the trend...

Here's an 18-second summary on why most foundries use Crown Hill Seacoal Facing for venting molds.

The high volatile content (see Bureau of Mines figures) of Crown Hill means quick flash. Since the fusion point of the small ash residue is 2980° F., molten iron cannot fuse it, and low sulphur content eliminates hard spots. In short, peeling is easy and cleaning costs *come down*. Try Crown Hill, choice of most foundrymen.

FIGURES FROM BUREAU OF MINES
DEPT. OF INTERIOR OF THE U. S.

(Moisture Free)

PROXIMATE ANALYSIS

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash . . . 2980°F

SEE YOU AT THE SHOW
BOOTHS 1112 and 1116

THE FEDERAL FOUNDRY SUPPLY COMPANY

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA.
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4600 East 71st Street
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MARCH, 1950

THE FOUNDRY

VOLUME 78—NUMBER 3

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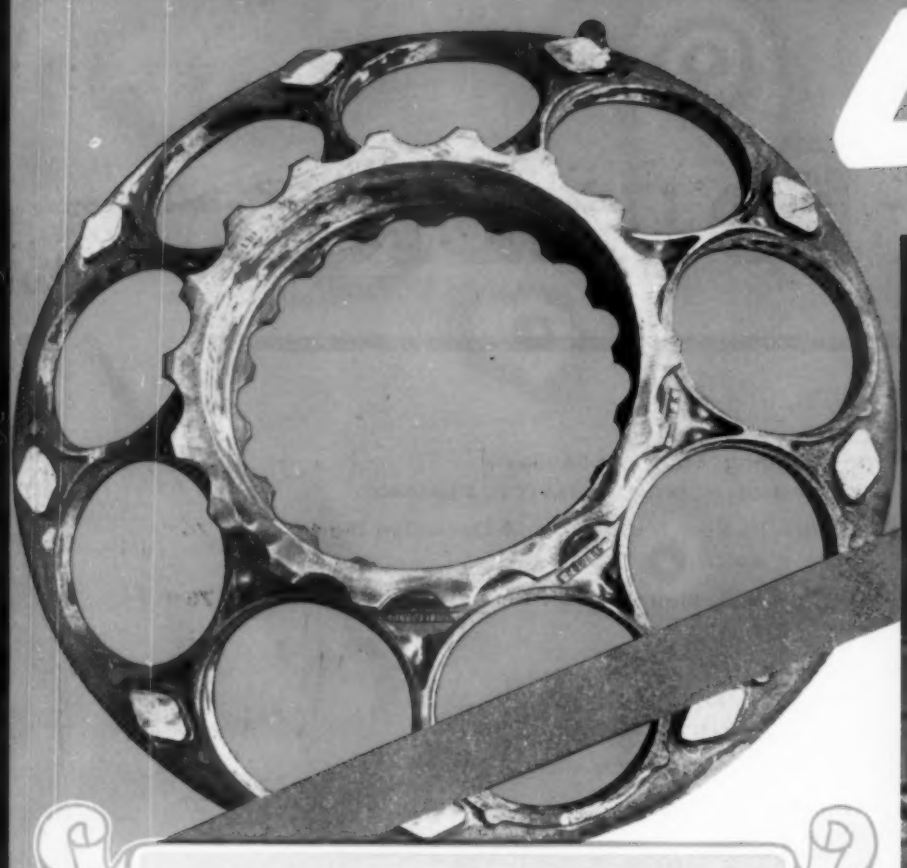
LINOIL



This alloy iron casting—a burner support for a Pratt & Whitney jet-aircraft engine—calls for a dimensional accuracy of 1/20,000th of an inch. To assure such close tolerances, Howard Foundry casts it in a dry sand mold . . . LINOIL bonded for dependable results.

After baking, the center core is set into the bottom slab, which is made with a slightly coarser grade of Silica sand. Notice the strength of the center core section.

One of the main core sections is this center core, shown here after being drawn on one of Howard's hugh rollover machines. Notice the sharp edges and the clean draw. For smoothness, the core is faced with a fine mesh Silica sand, LINOIL bonded for maximum strength.

CORE MOLDS AID QUALITY CONTROL

at HOWARD FOUNDRY COMPANY • CHICAGO, ILLINOIS

Here is the story of how LINOIL helps Howard Foundry's Semi-Steel Division produce top quality castings for an exacting customer — the aircraft industry.

Your customers are also exacting, and your quality is as important to you as Howard's is to them. That's why so many foundries use and depend upon LINOIL core oils. The best products require the best of materials.

If you're not now making your cores with LINOIL, why not talk to your LINOIL representative on his next visit? Ask him to show you how LINOIL's performance and LINOIL's price will help you in your quality control.

The assembly is then gauged for accuracy before the cheek core (shown in background) is set in place on top. Both center and cheek cores must be strong, yet collapsible . . . because casting thickness in some spots is as low as .150 inches. In addition, cores must be well baked and gas-free . . . since these castings undergo a 100% X-ray inspection before shipment.

THE LINOIL — THE LOGICAL OIL

THE WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET • CLEVELAND 2, OHIO

How Many $$$ Do You Want to SAVE

Foundrymen say:

ROTOBLAST GETS CASTINGS CLEAN AS A PIN!

ROTOBLAST gives better blast cleaning at lower cost. Example: At Lewistown Foundry, where this before and after picture was taken, J. W. Lequea, foundry manager, said: "ROTOBLAST *gets hard-to-clean castings like these really clean. Cleaning time has been cut 87½%, cleaning costs reduced 55%. Pangborn* ROTOBLAST *is the equipment for us!*"

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

Pangborn

* Trademark of Pangborn Corporation

on Blast Cleaning?

Here's Your Answer:

$11,000 A YEAR: If you produce both large and small castings and can clean them in the same piece of equipment—the answer to low-cost cleaning in your plant is a ROTOBLAST* Table-Room. *Example:* A foundry in Pennsylvania found a ROTOBLAST Table-Room saved them $11,000 a year on labor alone!

$846 A MONTH: If your production is high and consists of both large and small castings with hard-to-clean pockets, get a new ROTOBLAST "NL" Room for your plant. *Example:* A printing press manufacturer in Ohio saves over $846 a month on labor costs with this cleaning set-up!

$100 A WEEK: If your foundry produces a heavy volume of small, intricate castings, plus additional production of large castings, specify ROTOBLAST Barrels and a "Turn-Style" Table. *Example:* A medium-size foundry in Wisconsin did just that and cut cleaning costs more than $100 a week the first year!

$100 a Week

$11,000 a Year

$846 a Month

NO MATTER how many castings you clean a day—whether the castings are large or small—if you use old-fashioned blast cleaning equipment, Pangborn ROTOBLAST can *save you money.* Read the reports at the left—in every case ROTOBLAST cut cleaning costs from 25% to 55%, with added savings in abrasives and labor.

FIND OUT ABOUT ROTOBLAST! If you want low-cost blast cleaning at no sacrifice in quality specify Pangborn ROTOBLAST. Chances are a standard model ROTOBLAST Table, Barrel, Table-Room, Room or a combination will solve your cleaning problem completely. Dont delay . . . get the facts on ROTOBLAST today.

Pangborn ROTOBLAST saves you money these 5 ways:

SAVES LABOR: One ROTOBLAST machine and operator can do as much as a two-man crew and old-fashioned equipment.

SAVES SPACE: In many cases, one ROTOBLAST machine replaces five or more old-fashioned machines, requires less space.

SAVES TIME: Cases on record prove ROTOBLAST can cut cleaning time up to 95.8% compared with old-style methods.

SAVES POWER: Modern ROTOBLAST uses but 15-20 h.p. compared to old-fashioned equipment requiring 120 h.p. for same job.

SAVES TOOLS: On work cleaned with ROTOBLAST, cutting tools last up to ⅓ longer because no scale is left to dull edges

SAVINGS MEAN PROFITS

Write for FREE Bulletin 214 Today

Contains full details and specifications on ROTOBLAST. For your personal copy address:

PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment.

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

BLAST CLEANS CHEAPER

with the right equipment for every job

"Control Over Quality And Costs Paramount"

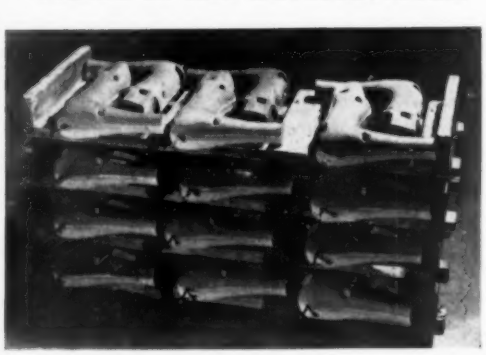
THE FOUNDRY
WHEREVER METALS ARE CAST

—MAKES IT WORTH WHILE TO

"Champion

YOUR FOUNDRY

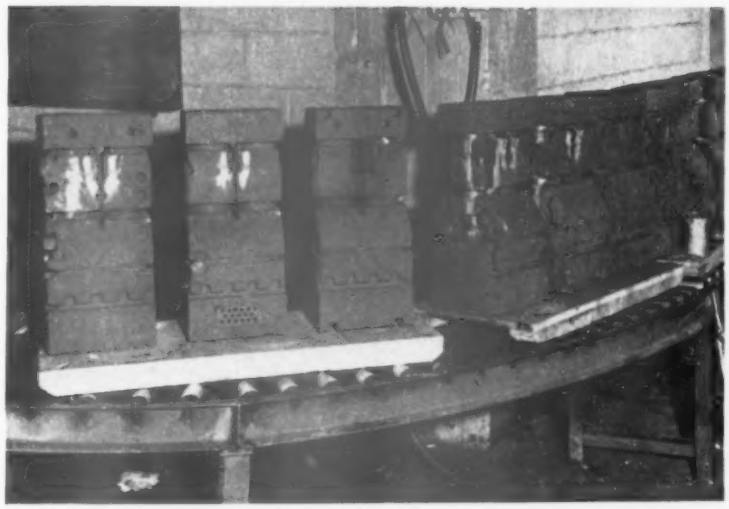
You take a long step forward toward quality and cost control when you equip with Champion Core Blowers and Molding Machines. Foundrymen of long experience designed and built these machines on the basis of a sound knowledge of what it takes to produce high quality castings at a profit. That's why you'll find Champion equipment at work in the leading foundries such as those represented in this advertisement.



Champion CB12 Core Blower, at National Sewing Machine Company, Belvidere, Illinois, blows cores for this late model portable electric sewing machine. "They do a first class job, FAST."

Champion CB18 Core Blower at Oliver Farm Equipment Company's foundry at Charles City, Iowa. Six similar sections blown on this machine form the core of a six cylinder gasoline engine casting, used in the power plant of the latest type farm tractor.

ize"



From the newest, smallest model, the "Junior" Champion, up to the mammoth CB400, every Champion Core Blower possesses the same distinctive features, the same unique blow valve, which assure a perfect core every time, in a fraction of a second, with the standard air pressure of 85 pounds.

Operation is safe, simple, speedy! There's a size and type for every job. Talk with us about your core requirements . . . you'll find it pays!

CHAMPION FOUNDRY AND MACHINE COMPANY

SALES OFFICE: 1314 W. 21st STREET
CHICAGO 8, ILLINOIS

GENERAL OFFICE AND PLANT:
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MOLDING MACHINES **CORE BLOWERS** **THE ELECTRIC RIDDLE**

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Foundry men all agree that there is **"NO SUBSTITUTE FOR SPEED".** We, here at NICHOLLS have developed a complete line of Molding Machines, both stationary and portable types for the **SPEEDY** production of light, medium and heavy castings. Every NICHOLLS MACHINE is known for its reputation of Precision, Low Upkeep, Big Output and **SPEED** to help you meet production deadlines! **Why not write us today for descriptive literature?**

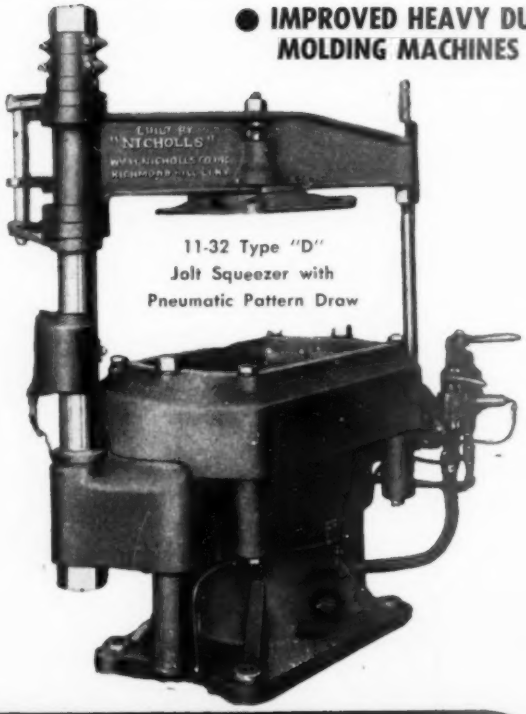
Wm. H. NICHOLLS Co., Inc.

RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

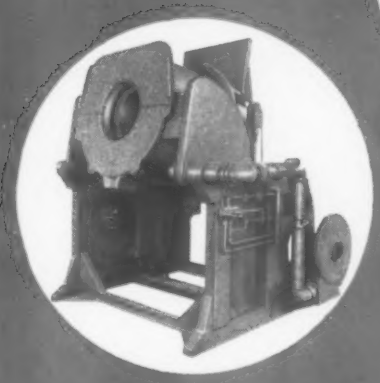
FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPE AND GREAT BRITAIN—GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND.

● **IMPROVED HEAVY DUTY MOLDING MACHINES**

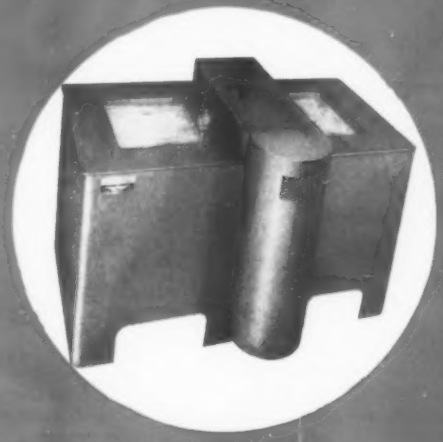


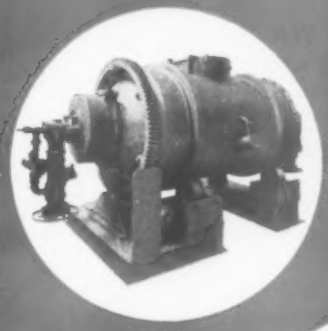
11-32 Type "D"
Jolt Squeezer with
Pneumatic Pattern Draw

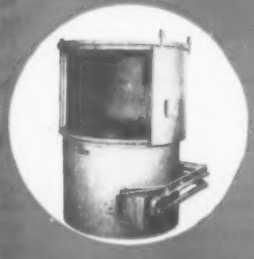
NICHOLLS



MELTING AND HOLDING FURNACES







Lindberg-Fisher builds all kinds of melting and holding equipment . . . gas . . . oil . . . electric . . . induction . . . arc and high frequency. Lindberg-Fisher engineers can intelligently and without prejudice recommend the proper type of furnace to best suit your needs and conditions.

Bulletin 551 covers the complete melting line. Write for your copy today.

LINDBERG-Fisher A DIVISION OF LINDBERG ENGINEERING CO.

2453 WEST HUBBARD STREET · CHICAGO 12, ILLINOIS

New.... Improved

DELTA CORE & MOLD WASHES

SPEED PRODUCTION OF BETTER, CLEANER CASTINGS AT *Lower Cost*

Three easy-to-understand reasons why more foundries use DELTA Core and Mold Washes . . .

1. **MORE PERFECT CASTINGS . . .**
2. **LOWER CLEANING ROOM COSTS . . .**
3. **LESS SCRAP IN MACHINING.**

DELTA CORE AND MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GRAY IRON AND MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR GRAY IRON
Blackoat S-5 — A new and different wash.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-HI-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT — High-fusion-temp. Wash.

•

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

NEW mechanical processing and improved chemical formulation . . . developed by DELTA Research . . . have resulted in many decided advancements in both the quality and characteristics of DELTA CORE and MOLD WASHES.

Maximum uniformity of surface coverage is obtained with lower Beaume mixes, using more water. Penetration characteristics are THREE times greater (from 10 to 12 grains deep) and the density of the wash on the surface has been increased 40%.

Due to increased surface density the rate heat conductivity is speeded up and metal in contact with the washed surfaces cools more rapidly, resulting in smoother casting finish.

HERE'S WHY

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 10 to 12 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.

The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

● *Ask for a liberal working sample. You will also receive complete data on how to use DELTA Core and Mold Washes in your foundry.*

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

Why P&H *Job-Engineered* Cranes mean better service for you

When you buy a P&H Overhead Crane, you buy proved performance. Your crane will be *engineered* to meet the requirements of your specific job — coordinated with P&H electrical equipment, designed . . . not adapted . . . for crane service. There will be ample reserve capacity, adequate service life, maximum safety and every modern operating advantage. All these combine to give you long years of crane service with the least trouble and maintenance cost.

P&H Magnetorque* control for AC cranes brings you one of the most important improvements of the past 20 years. Ask your P&H Sales Engineers about it.

These are Added Values which P&H has learned to put into the building of overhead cranes through 65 years of progressive leadership. Perhaps that explains the overwhelming preference for P&H Cranes.

***T.M. of Harnischfeger Corporation for electro-magnetic type brake.**

P&H

OVERHEAD CRANES

4405 West National Avenue
Milwaukee 14, Wisconsin

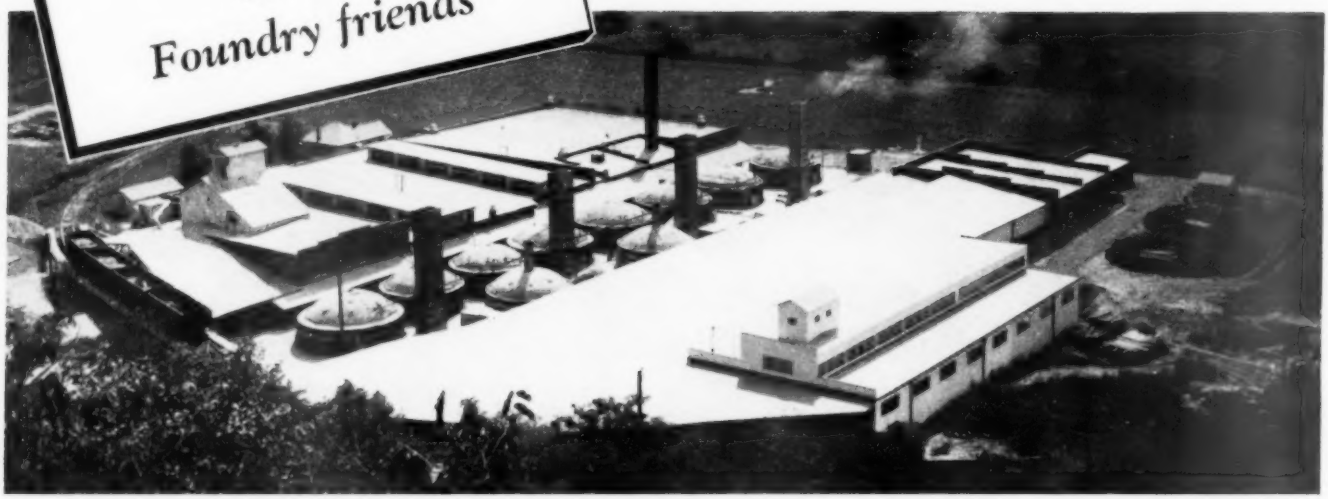
HARNISCHFEGER CORPORATION

Write for your copy of Bulletin C-39 describing P&H Magnetorque Control for AC cranes.

16,000 P&H CRANES SERVE AMERICAN INDUSTRY — FAR MORE THAN ANY OTHER

An Invitation to our Foundry friends

REFRACTORIES



IRONTON
Foundry Representatives

The Ironton Fire Brick Co.
Ironton, Ohio

The Ironton Fire Brick Co.
Box 4728, Jacksonville 1, Fla.

Beeman Sales & Engr. Co.
641 Buhl Bldg., Detroit 26, Mich.

Earl A. Swenson
Box 651, Columbus 16, Ohio

Firegan Sales Co.
141 W. Jackson Blvd., Chicago 4, Ill.

Henry M. Witmyer
1311 Proctor St., Baltimore Md.

Pa. Foundry Supply & Sand Co.
Ashland & East Lewis Sts.
Philadelphia 24, Pa.

M. D. Lucas
2116 Keith Bldg., Cleveland 15, Ohio

Frederic B. Stevens, Inc.
93 Stone Street, Buffalo 12, N. Y.

Carl F. Miller Co., Inc.
1217 Sixth Ave. So.
Seattle 4, Washington

Klein-Farris Co., Inc.
683 Atlantic Ave., Boston 11, Mass.

Interstate Supply & Equip. Co.
647 W. Virginia St.
Milwaukee 4, Wisc.

Robbins and Bohr
535 Chattanooga Bank Bldg.
Chattanooga 2, Tenn.

The Ironton Fire Brick Company extends a cordial invitation to its many friends in the foundry industry to visit its plant and fire clay mines.

Here at Ironton you will see a clean, modern, thoroughly integrated refractories manufacturing plant. You will see the production of machine made cupola blocks—you will see the blending of "Ironton Berlite", "Ironton Caro-Line" and "Ironton No-joint". Then an interesting 60 mile motor trip will take you to our fire clay mines at Bradmyer, Carter County, Kentucky—right in the heart of the famous Olive Hill District.

After viewing these properties, you will understand why "Ironton" is and will continue to be a dependable source of foundry refractories for many years to come.

THE IRONTON FIRE BRICK COMPANY
RELIABLE REFRACTORIES
IRONTON OHIO

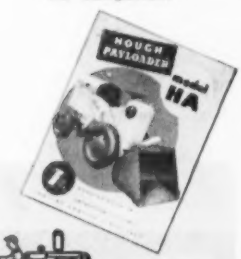
Pick PAYLOADERS

FOR THE *BULK* OF YOUR MATERIAL HANDLING

Payloaders are a proven, successful bulk-material-handling system in hundreds of foundries and metal working plants. They handle and rehandle sand, slag, coke, castings, stone, clay, scrap, sprues and waste materials fast and cheaply... eliminate many slow, laborious, costly operations.

Large pneumatic tires, short wheel bases and multiple speeds in both directions provide traction and maneuverability on or off hard floors, up ramps, through doorways and narrow aisles. It will pay *you* to find out how Payloaders can slash *your* material handling costs. See your Hough Distributor or write The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

Send for catalogs on any size Payloader: the 12 cu. ft. Model HA; the ¾ yd. HF; the 1¼ yd. HL; the 1½ yd. HM. There is no obligation.



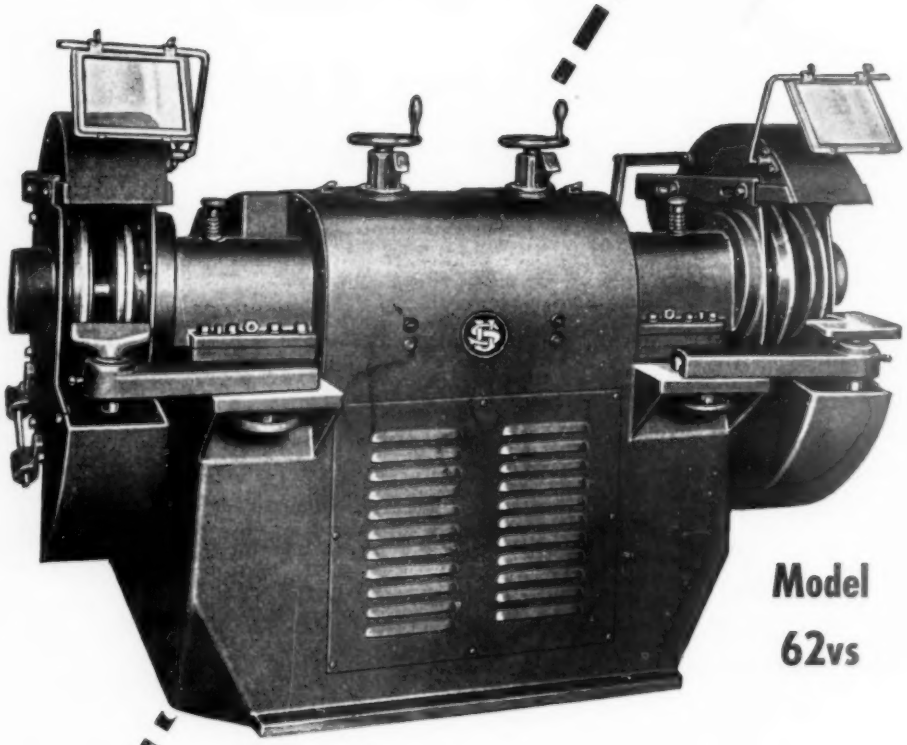
SAY HUFF

HOUGH PAYLOADER

Manufactured by THE FRANK G. HOUGH CO.

UNITED STATES DUAL MOTOR VARI-SPEED SNAGGING GRINDER

INSURE PERFECT LOW-COST GRINDING IN YOUR FOUNDRY



Model 62vs

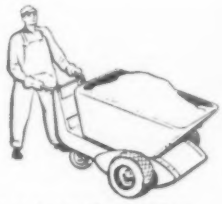
FOUNDRIES large or small, which insist on perfect performance and low costs choose Model 62VS. Results show INCREASED PRODUCTION, LONGER wheel life and MOST ECONOMICAL OPERATION.

Contact Your Distributor or Write Direct

FOR VITRIFIED OR HIGH SPEED WHEELS

Maximum peripheral speed can be maintained for the entire life of the wheels. WHEEL GUARDS ARE ADJUSTABLE TO WHEEL WEAR and are interlocked with speed changer. Totally enclosed fan-cooled ball-bearing motors. Push button stations on front of pedestal. Heavy chrome-manganese spindles operate in heavy duty ball bearings which are enclosed in dustproof housing with inner and outer oil seals.

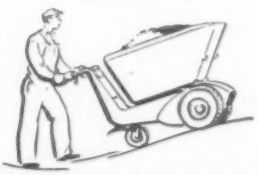
The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO



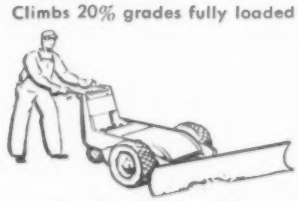
Bucket holds 10 cubic feet . . . 18 with sideboards

Mechanically dumped . . . operates by foot pedal

9-square-foot steel platform takes half-ton loads



Climbs 20% grades fully loaded



50-inch steel blade makes Prime Mover an efficient snow plow

FEATURES:

- gear driven . . . no belts or chains
- fully enclosed engine protected against dirt and moisture
- clutch, engine, transmission all run in oil
- switch from bucket to platform without tools . . . in less than a minute
- turns in its own length (63½"); width 31½"
- 3-gallon tankful of fuel gives 8 hours continuous service

A PRODUCT OF

BELL *Aircraft*

CORPORATION

*Patents & T. M. Reg. Pending Copyright, 1949

The BELL Prime Mover*

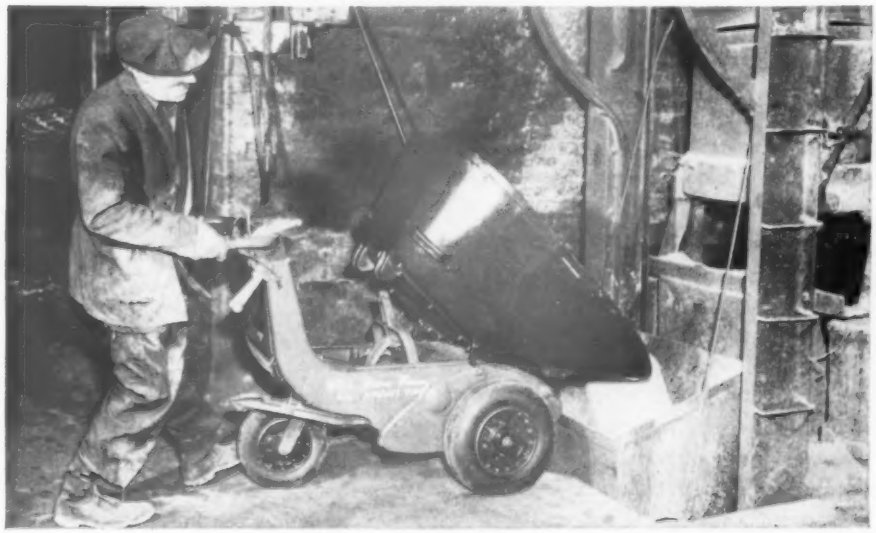
. . . here's what foundries say about this versatile, cost-cutting machine

Rochester, N. Y.—"We save from 8 to 24 man-days each week with a Prime Mover. It hauls sand 500-600 feet from outside storage bins to inside bins, then to bench and floor moulding operations. Also use bucket to haul silicon and fire clay. Platform-equipped Prime Mover is used to move pig iron to inside storage room near charging elevator."

Detroit, Mich.—"Prime Mover takes brass borings from box car to storage pit via scales. Then to foundry for casting. We carry 1150-pound loads, which is *twice as much as can be carried by wheelbarrow operated by two men.*"

Charleston, W. Va.—"This is a small foundry and, because of the extra load carried by the Prime Mover and the machine's ability to work in narrow aisles, the operator of the Prime Mover saves enough time in the distribution of sand so that he can also operate the muller."

Linfield, Pa.—"Prime Mover used to distribute core and moulding sand, to remove cupola residue, to distribute concrete from ready-mix truck for periodic pouring on sections of floor. Estimated savings of 2 to 4 man-days daily with one machine."



● Convincing as these statements are, they still do not do full justice to this remarkable machine. Only an on-the-job demonstration can prove to you what the Prime Mover can mean in your own foundry. If you would like to see a demonstration and evaluate this machine yourself, we'll gladly arrange one through a member of our nationwide sales and service organization. For more information, sign this coupon and attach to your letterhead.

SEND COUPON NOW

BELL AIRCRAFT CORPORATION,
Post Office Box 1D3, Buffalo 5, New York

Please send me facts on the *Bell Prime Mover*. Who is the nearest distributor?

Name ..... *Company* .....

Address .....

City, Zone, and State .....

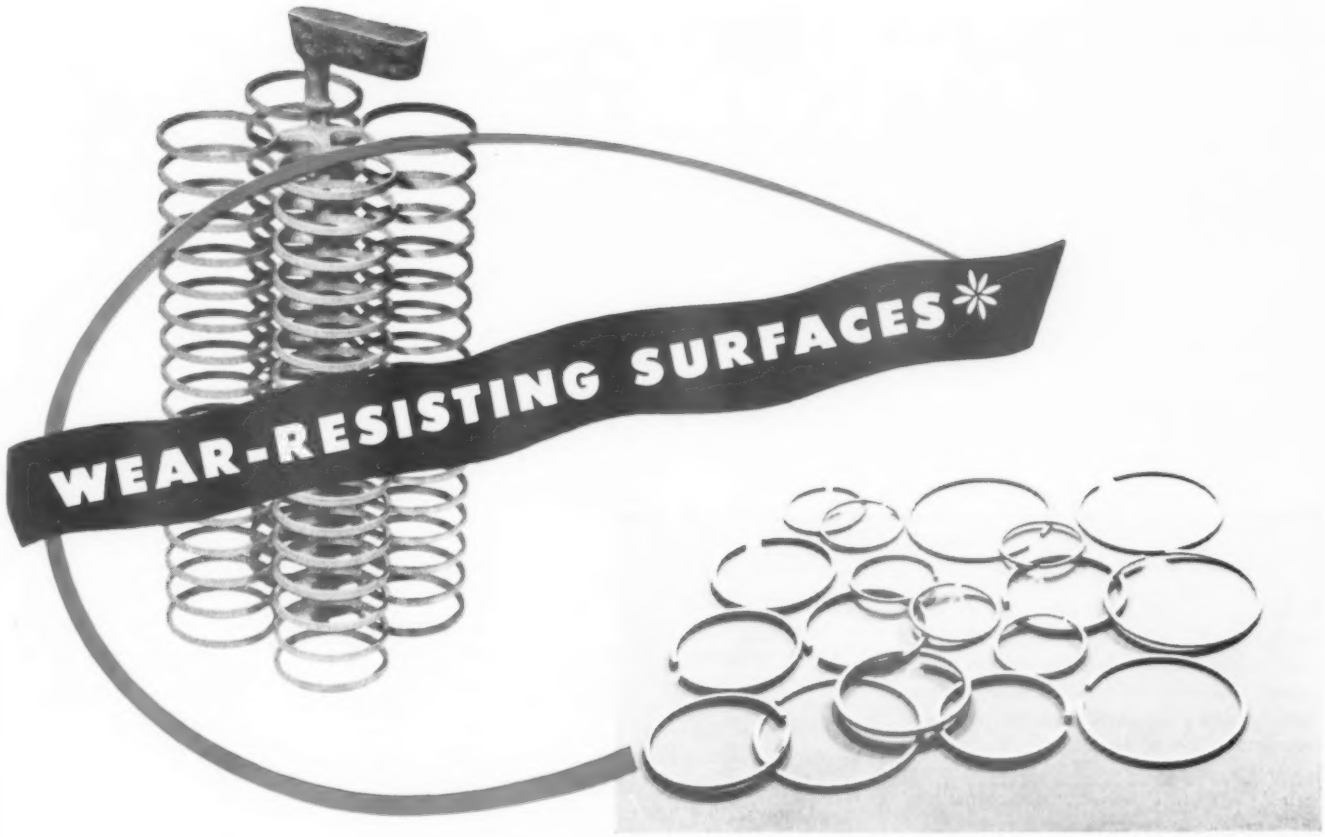
Longer Nozzle Life Every Time

IF YOU are looking for a way to increase nozzle life in your blast cleaning department—if you wish to do away with costly time-wasting while worn-out nozzles are replaced with new nozzles—if you are searching for means to improve blasting efficiency and increase production—there is one answer for all three problems: NORBIDE Nozzles. Made of Norton Boron Carbide—the hardest man-made material—NORBIDE Nozzles will outwear conventional types fifty to one. This same wear-resistance enables these nozzles to retain peak efficiency for a long period with resultant production increases. Air consumption is reduced 10 to 20%. Stream contour and abrasive velocity are maintained.

For information as to size and price write for Bulletin No. 543

NORTON COMPANY
Worcester 6, Massachusetts

NORTON NORBIDE PRODUCTS



* another clue to the Added Value in

CHATEAUGAY PIG IRON

Wear-resistance is a vitally important requisite of automotive piston rings, such as those shown above. Yet, that's *but one* of several good reasons why a leading manufacturer uses Republic CHATEAUGAY Pig Iron in his piston ring castings.

High physical requirements... extensive machining operations—including grinding, milling, turning, boring, slotting and chamfering... these, too, are reasons for using CHATEAUGAY—the copper-free, low-phosphorus iron that consistently outperforms other irons.

A Republic Pig Iron Metallurgist will be glad to tell you about the many quality-insuring advantages of CHATEAUGAY Pig Iron. He will show you how you, too, can profit from its use.

Just tell us when you would like to see him.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic **PIG IRON**

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

High-Chromium, High-Carbon Iron

. . . the Iron That Hardens as it Wears

In many applications involving extreme abrasion, ordinary work-hardening alloys are not suitable. This is because most of these alloys require a definite pounding action for a martensite transformation, and the scouring action of an abrasive is not sufficient for development of high wear resistance. For this reason, high-chromium, high-carbon irons were developed – irons that wear harden.

Chromium Content of Irons Ranges from 24 to 30 Per Cent

These irons are made in the electric furnace and have the following composition range:

Chromium	24 to 30 per cent
Carbon	2.25 to 2.85 per cent
Manganese	0.50 to 1.25 per cent
Silicon	0.50 to 1.50 per cent
Nickel	minimum
Iron	balance

Irons of this composition are readily castable by steel casting techniques.

Development of Greater Wear Resistance by Heat Treatment

Structurally, these irons consist of primary iron-chromium carbides in a matrix of iron-chromium solid solution and secondary iron-chromium carbides. They are hard in the as-cast condition (500 to 550 Brinell), but when they are given an austenitization heat-treatment they develop much higher hardness (about 600 Brinell), and also have greatly improved wear resistance. Austenitization consists of heating these irons to a temperature of about 2012 deg. F. for an hour, then allowing them to cool in air. This heat-treatment promotes the formation of very unstable austenite–austenite that will transform to a harder martensitic end-product even under rubbing or mild impingement action. Austenitization has been found to be far more effective in increasing wear resistance than the promotion of unstable austenite by the addition of ferrite-forming alloying elements.

High-chromium, high-carbon irons can also be annealed to sufficiently low-hardness values for grinding or simple machining. Hardnesses as low as 350 to 450 Brinell can be obtained by heating the castings to temperatures of 1400 to 1450 deg. F. for 12 to 24 hours, then allowing them to cool in air.

Irons Have Wear Resistance Many Times That of Other Alloys

Austenitized high-chromium irons have been known to last as much as 21 times longer than other wear-resistant alloys in applications involving extreme frictional abrasion. These applications include sand-blast nozzles and liners, pantograph contact shoes, grinding disks, pulleys, chute-liner plates, dredge-pump liners, and rollers for crushing various hard materials.

In a recent test, high-chromium iron was compared to special wear-resistant steel castings as the material for hammers in a machine that was used to crush abrasive material. The chrome-iron hammers were found to have almost 7 times the wear resistance of the steel castings.

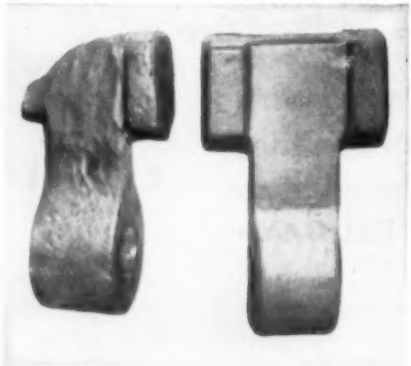


Fig. 1. After crushing the same amount of abrasive material in a hammer mill, the badly worn steel casting (left) had a weight loss of 37 per cent while the high-chromium iron casting (right) lost only 5.5 per cent.

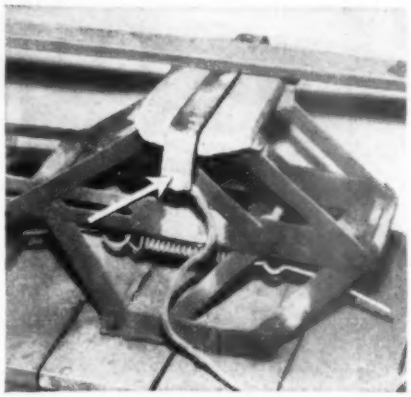


Fig. 2. This chrome-iron pantograph shoe had a service life of about 10 years. A tool steel that was used in similar service wore out in about 3 or 4 months; copper lasted about 24 hours.

When thoroughly backed up with zinc, the iron also has enough shock resistance to be used effectively as crushing hammers and jaw plates for many severe rock-handling jobs.

Metallurgical Service Available

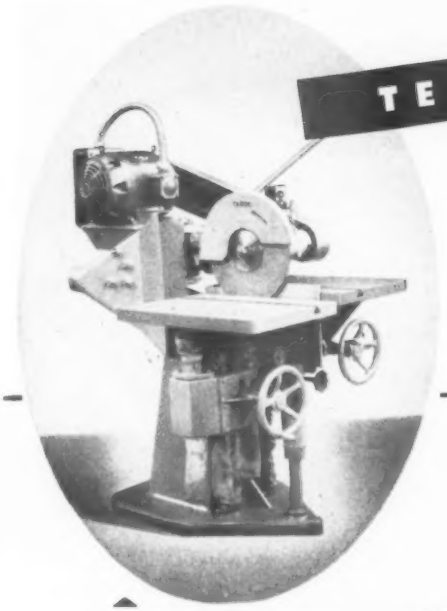
For years, ELECTROMET high-carbon ferrochrome has been used to make chromium additions to abrasion-resistant high-chromium irons. If you should have any questions about either the production or use of these irons, write to the nearest ELECTROMET office. Our metallurgists will be glad to give many valuable suggestions and recommendations on how to make or use this iron most effectively.

Write for a free copy of the ELECTROMET publication, "Abrasion-Resistant High-Chromium Iron." This booklet is a collection of some of the best available information on how to make and to use abrasion resistant iron castings most efficiently.

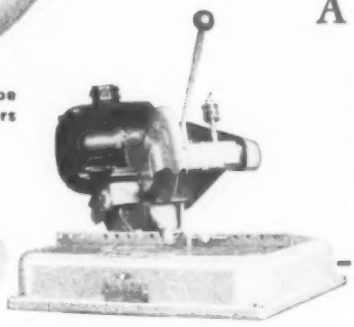
The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

TEST YOUR

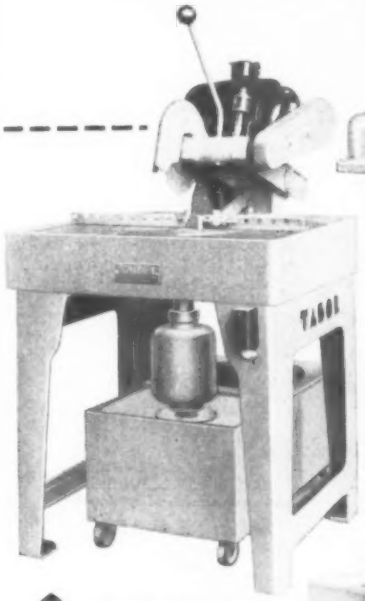
Industrial Quotient!



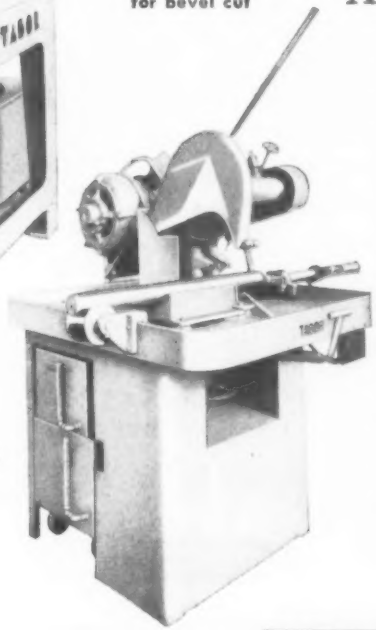
10 H.P. split-table type cutoff for gates and risers



3 H.P. bench-type cutoff for bar stock and shapes—set for bevel cut



3 H.P. floor-type cutoff for bar stock and shapes—equipped for bevel wet cutting



10 H.P. cutoff for bar stock and shapes—with coolant reconditioning tanks

Q WHAT DOES EVERY FOUNDRYMAN KNOW?

A Tabor's line of Abrasive Cutoff machines for the foundry floor—machines that will cut gates and risers from castings of even the toughest metals in a matter of seconds—clean, close-to-the-casting cuts with few or no snags or burrs—a line of cutoffs that ranges from small "standards" to giant "universals."

Q WHAT SHOULD EVERY FOUNDRYMAN KNOW?

A That Tabor's Cutoff machine "family" has grown to include units for cutting bar stock and shapes—a point of special importance to management of captive shops and foundries with their own machine shop operation.

There's a size and type to meet every need. Capacities range from 3 to 15 H.P. There are bench-mount types and floor types. They can be furnished for wet or dry cutting—bevel or right angle.

The "heart" of these machines—the spindle—bears the same stamp of excellence for which our foundry units are famous. Timken Bearing-mounted, specially constructed, the spindle assures cool running and reduces end-play adjustment to an all-time low.

It'll pay you to get full details on these tough, precise, "production-minded" newcomers. We've prepared new bulletins. They're yours for the asking—so write today.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6223 TACONY STREET • PHILADELPHIA 35, PENNA.

THEY'RE CUT OUT...TO CUTOFF!

STOP AIR LOSSES

GET RID OF AIR LINE TROUBLES

WITH

Original BOWES COUPLINGS

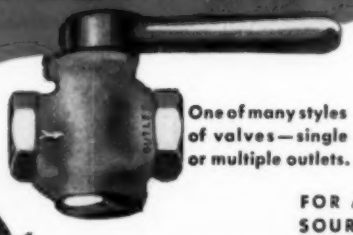
PRESSURE SEATED

AIR VALVES

NIPPLES • FITTINGS • BLOW GUNS

WRITE FOR NEW CATALOG

Describing complete line of couplings, valves and fittings.



One of many styles of valves—single or multiple outlets.

Nipples in all commonly used pipe and hose sizes.

Steel or brass blow guns —lever or button style.

FOR ALL YOUR AIR LINE REQUIREMENTS AT ONE SOURCE. SEE YOUR SUPPLY HOUSE SALESMAN.

Now Manufactured Exclusively by

U.S. BOWES COUPLINGS • VALVES • BLOW GUNS AND FITTINGS — Standard of the World — THE UNITED STATES AIR COMPRESSOR CO. CLEVELAND, OHIO

THE UNITED STATES AIR COMPRESSOR COMPANY

5300 HARVARD AVENUE • • • • CLEVELAND 5, OHIO

ORIGINAL BOWES COUPLINGS • VALVES • FITTINGS • AIR COMPRESSORS

Model CH-20 Truscon Power Handled Flask.

Model CH-40 Truscon Flask for Extra Heavy Duty.

HEADQUARTERS
FOR STEEL FOUNDRY FLASKS

THE SUCCESS of modern foundry methods depends upon the speed and economy with which molding operations can be handled.

Truscon's Pressed Steel Division—nationally known for the quality of its products and the dependability of its service—is fully equipped and prepared to handle your foundry flask requirements. The Pressed Steel Division's central location assures efficient service for your needs. Write for free catalog describing the complete line of Truscon Steel Foundry Flasks.

TRUSCON
STEEL COMPANY
PRESSED STEEL DIVISION
6100 TRUSCON AVE. • CLEVELAND 4, OHIO
Subsidiary of Republic Steel Corporation

Model OM-1 Truscon Flask for One-Man Handling.

Model OM-4 Truscon Flask for One-Man Handling.

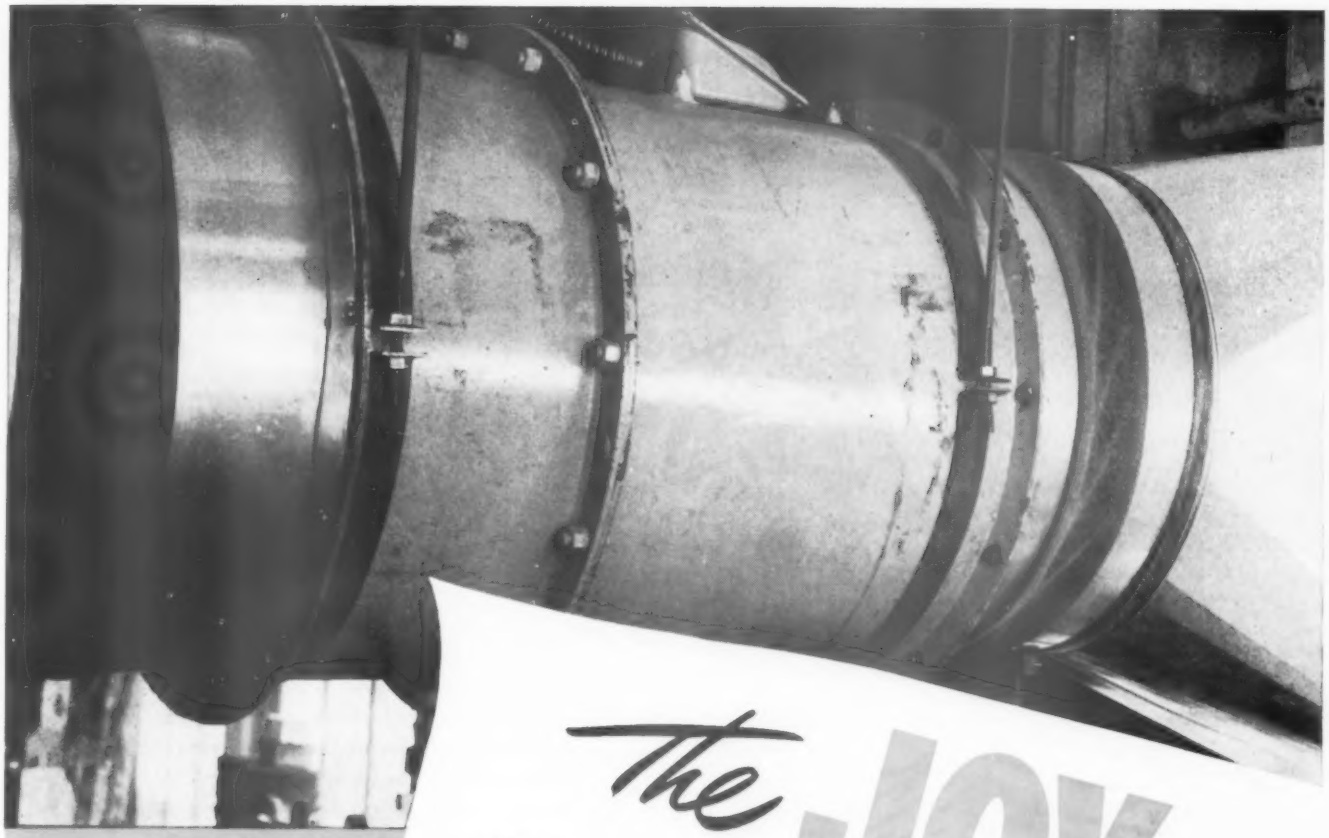
Model TMR-60 Round Truscon Steel Flask for Two-Man Handling.

Model TM-10 Truscon Flask for Two-Man Handling.

Model TM-12 Truscon Flask for Two-Man Handling.

...always low-cost production
...like INTERNATIONAL GRAPHITE ELECTRODES

ICE International GRAPHITE AND ELECTRODE CORP.
ST. MARYS, PA.
6260



A JOY Axivane Fan in a commercial store—chosen for its low noise level, compactness, and simple and easy installation.

The JOY AXIVANE® FAN

Mounts Right in the Air Duct—

Saves space, installation costs, gives you quieter, more efficient ventilation!

Write for Bulletins, or

Consult a Joy Engineer

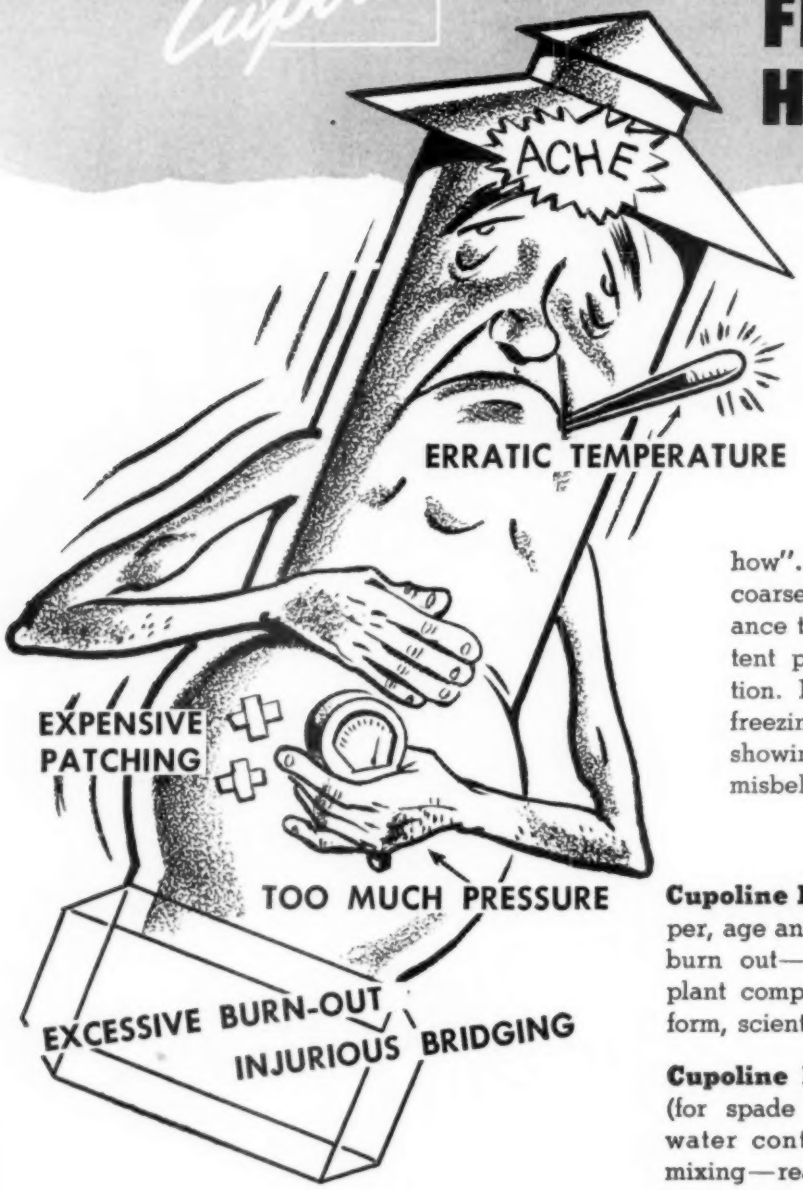
W&D 1 2830

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

LET *Cupoline* FREE YOUR CUPOLAS FROM THESE HEADACHES



It's important—this matter of patching cupolas—an essential, not an incidental, in foundry practice. Cheap patching is an extravagance you can't afford. Cupoline, a Cone 33 silica base refractory, was developed by scientific research directed by practical experience plus "know-how". Graded and balanced as to fine and coarse, it has maximum density and resistance to slag penetration. Its low clay content permits minimum water in application. If your cupola has been bridging, freezing up, running erratic chill depth, showing high pressures and otherwise misbehaving, give Cupoline a chance.

★ ★ ★

Cupoline DRY Mix (for hand ramming). Temper, age and ram lightly into place. No joints to burn out—homogeneous patch. No errors in plant compounding, blending or mixing; uniform, scientifically correct mixture.

Cupoline PLASTIC Patching Refractory (for spade tamping). Properly aged—correct water content—no confusing formulae for mixing—ready for use. No weighing, no tempering, no splintered or sharp ganister. Just tamp into place.

BONDACT Mix (for air placement). A dry, screened mix to use in Bondact pressure machine. No need to store dry materials or buy a mixer for patching materials. Optimum combination for air-placement lining and patching.

Let an ECP engineer look into your patching needs.

EASTERN CLAY PRODUCTS, INC., JACKSON, OHIO

ECP

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

I COULDN'T BELIEVE MY EYES WHEN TEST* SHOWED

Malleabrasive CUT BLAST CLEANING COSTS 58.9%

*. . . made at Ohio Forge & Machine Corporation.

The results of Ohio Forge & Machine Corporation's seven week Malleabrasive test were terrific . . . *43.5%* saved on cost of abrasive alone!

The test was run on forgings, and the next big saving to show up was *81.3%* less cost for replacement parts!

Less down time, less labor handling abrasive and replacement parts increased production 12.8% . . . *total savings*† add up to *58.9%* . . . big money no matter how you look at it!

Send for this Positive Proof!

Malleabrasive differs from every other shot and grit on the market today. It's more than "heat treated" or "annealed" . . . *Malleabrasive is guaranteed* to out-perform ordinary shot and grit when comparative tests are properly run!

See for yourself how Malleabrasive has cut cleaning costs up to 50% and more for other foundries! Recent tests of Malleabrasive give complete savings. Write for your copy today to: THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new black and orange striped 100-pound bags.

† *Send for test results which show total savings*

PATENTED‡

Malleabrasive®

‡ U.S. Patent #2184926 (other patents pending.)

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

. MANUFACTURERS OF METAL ABRASIVES SINCE 1907 .

Nash

GREAT CARS SINCE 1902

In a recent foundry modernization program at Nash Motors, Kenosha, Wisconsin, division of Nash-Kelvinator, two Allis-Chalmers centrifugal blowers replaced rotary positive blowers! Rated 14,000 cfm at 2.5 lbs. G, both blowers are driven at 3550 rpm by Allis-Chalmers induction motors. They are compact . . . mounted out-of-the-way on light, simple foundations.

Maintain Air Weight and Volume With A-C Blowers!

BOTH WEIGHT AND VOLUME OF CUPOLA AIR can be regulated with Allis-Chalmers centrifugal blowers equipped with air weight control. A-C blowers solve the problem of oxygen control in cupola operation by automatically delivering more or less air, as required, without the necessity of blowing off to atmosphere, as with positive pressure blowers.

With A-C blowers, a metered amount of oxygen enters the cupola; you get a uniform temperature and greater uniformity in composition of the metal.

NOTE FEATURES OF A-C BLOWERS!

▶LIGHT WEIGHT requires simple foundation. Close coupled design makes them compact.

▶SIMPLE CONSTRUCTION with one moving part, the impeller, usually "overhung" on the motor shaft — supported by motor bearings.

▶ONLY MINIMUM MAINTENANCE needed to operate A-C blowers with original efficiencies every day for years! Cast casings give long life impossible with fabricated construction.

Specify A-C blowers for new cupola installations or replacements! For more information, call your A-C Sales Office or write direct.

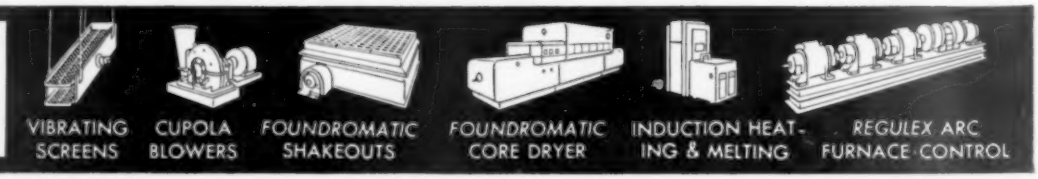
ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE. WIS.

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-2790

Foundry Equipment for Bigger Output-Better Working Conditions!



VIBRATING SCREENS | CUPOLA BLOWERS | FOUNDROMATIC SHAKEOUTS | FOUNDROMATIC CORE DRYER | INDUCTION HEATING & MELTING | REGULEX ARC FURNACE CONTROL

Maybe your core oil problem is different . . .

Houghton can "tailor" a core oil that will be a perfect fit!

Not that all Houghton core oils are of the "tailor-made" type. We have standard oils that have long been used with continuing success by foundries the world over.

But frequently problems arise in a foundry which cannot be solved by a regulation oil, no matter how excellent it may be for most work. Sometimes the oil is not the answer; it may be the oven, the baking time, the sand, the temperature, the core design . . . all these variables can be studied and a sound recommendation made.

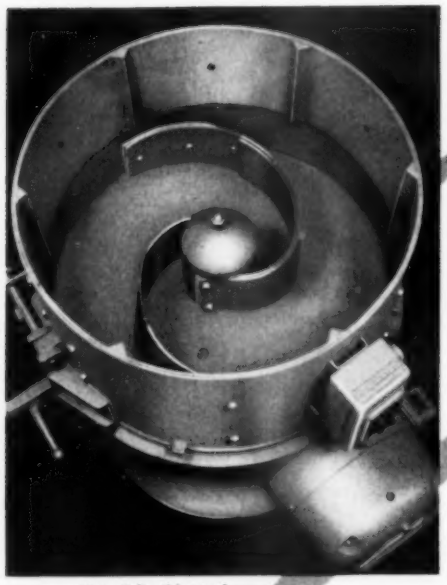
The point is that we're looking not only for production work for our regular oils, but also for those exceptions where a specially formulated oil may be required. We'll make such an oil to fit the job provided potential volume warrants it. And we'll study your problem along with you, putting our laboratory facilities at your disposal.

That's how we've made so many friends in the foundry industry. In 1950 we're out to enlarge that service, hence this offer. Please write E. F. Houghton & Co., Foundry Dept., 303 W. Lehigh Ave., Philadelphia 33, Pa. There's no obligation, of course, in talking it over with our technical staff.

HY-TEN

"Tailor-made" core oils—at "ready-to-wear" prices!

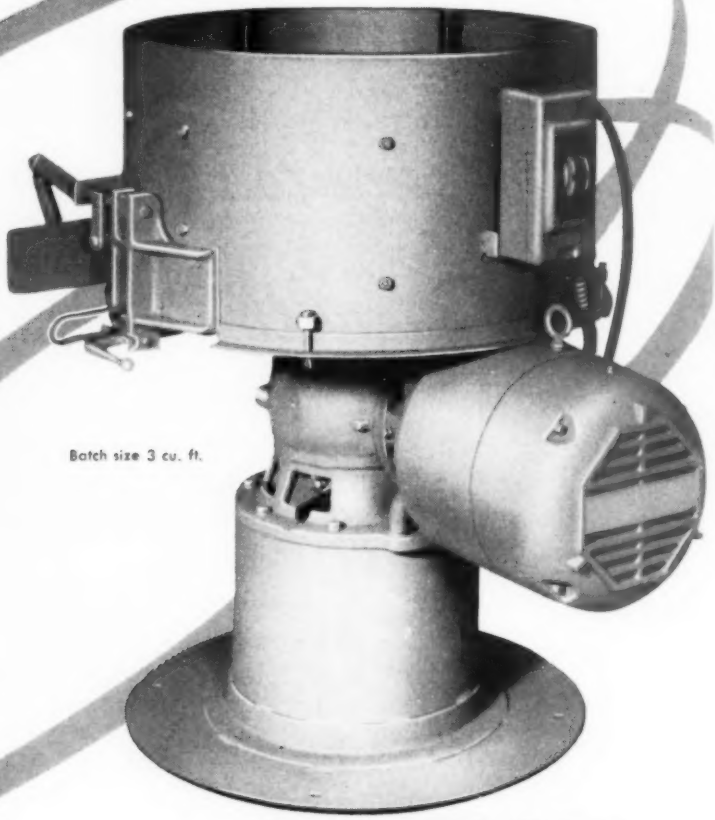
OTHER HOUGHTON PRODUCTS for the foundry include grinding oils, core box cleaners, wetting agents, fortified lubricants, heat treating salts, packings, leather belting.



Note 2 flexible steel rubbing arms.

WHIRLMIX

Discharge door is 28" off floor, high enough to accomodate a 3 cu. ft. wheelbarrow.



Batch size 3 cu. ft.

NEW BIG SAND MIXER

SMALL IN SIZE- IN PRODUCTION

● The Whirlmix, a big producer, will mix more sand per hour at lowest cost . . . 4,000 lbs. of oil core sand or facing sand *per hour.*

Small—compact, the Whirlmix is an integral unit which does not require a foundation. Weighs only 1,060 lbs. Can be moved easily by crane or lift truck from one location to another.

Two flexible spring steel whirling arms exert the proper pressure to the sand. No crushing of sand grains; no overheating of sand. This produces a uniform mixture of either core oil, dry core compound, or facing sand. The Whirlmix gives you a fluffy sand (does not need aerating), efficiently mixed without crushing.

If you want a mixer which will give you tonnage, an efficient mix, and complete satisfaction, write us today about this new sand mixer . . . Whirlmix (Model No. 300) . . . small in size, a little giant in production . . . only $1,185 f.o.b. Cleveland, Ohio.

SEE YOU AT BOOTHS 1112 AND 1116

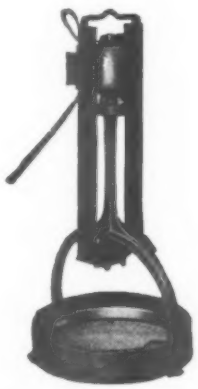
FEDERAL

THE FEDERAL FOUNDRY SUPPLY CO.
4600 EAST 71st STREET
CLEVELAND 5, OHIO

Federal

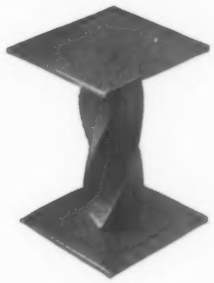
CLIMAX WIRE STRAIGHTENERS

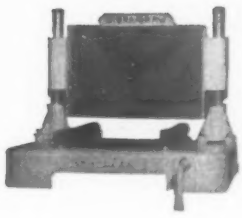
Any foundry, large or small, can cut production costs by straightening and reusing core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely —by unskilled labor. A complete descriptive circular is yours for the asking.



FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shoveling room. Write for information. Prompt delivery.





TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

"The Twist Does the Trick"

FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown at left. Immediate delivery—write for details.

SHUR-SPOT SPRUE

Designed for use on squeezer-made molds, Shur-Spot squeezes right down with the sand. When the squeezer board is removed, the Shur-Spot pops up and can be lifted right out. The result is a fully completed and properly located pouring sprue that requires no finishing. Shur-Spot Sprue eliminates danger of falling sand.

For complete information on the Shur-Spot Sprue, write for the circular on this low-priced, easy-to-use item.

FEDERAL VIBRATOR No. 2 & 5

Federal's own make and available for immediate delivery. Hard-chromed piston guarantees long life. For 110 volt, 60 cycle, single phase operation. $13.00 each, f.o.b. Cleveland; No. 5 for heavier duty—$17.00 each.

Federal also has a new "convenience outlet knee switch." No taping, soldering or wiring. Plug in—that's all. Carried in stock. $7.50 each, f.o.b. Cleveland, Ohio.

SEE YOU AT THE SHOW
BOOTHS 1112 and 1116

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

CROWN HILL, W. VA. · CHICAGO · MILWAUKEE · RICHMOND, VA. · ST. LOUIS

CHATTANOOGA, TENN. · MINNEAPOLIS · NEW YORK · DETROIT · UPTON, WYO.

speed doesn't sag under load

Because they work at full speed under all loads, CP Super Cycle Grinders remove more metal at less cost than other grinders. With the lowest ratio of weight to horsepower ever built into a portable tool, they are easier to handle . . . more quickly located on work . . . less tiring to hold.

Maintenance is outstandingly low. There are no brushes to replace, no armatures to burn out, because the motor—operating on 360 cycle, 3-phase, 220 volt current—is of squirrel cage induction type.

Straight grinders are available with 4", 6" and 8" elastic bonded grinding wheels; 2", 2½", 2¾", 4" and 6" vitrified wheels; 4", 6" and 8" wire brushes. Angle grinders have 6" cup wheels; angle sanders are available with 7" and 9" pads.

Write for copy of Catalog 905-2

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

A Buyer has to Sell . . . . *himself*

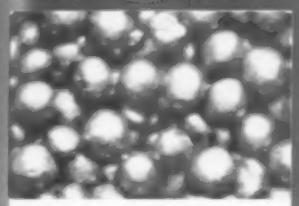
To us selling means "satisfied buying" — the kind of buying that is based upon tangible facts and clear-cut evidence. This calls for proof, not promises; facts, not fancies.

As we view it, our role in engineering and building top-flight equipment is to help you buy intelligently, scientifically . . . to help you install equipment that will bring the highest return on your investment. We believe that our success depends upon our ability to help you make wise buying decisions.

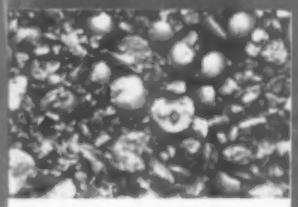
Soil Pipe Foundry saves 15.92 lbs. of abrasive per wheel hour

ACTUAL COST STUDY

ABRASIVE COSTS CUT 65% WITH TRU-STEEL SHOT



TRU-STEEL
No. 230 at Mag. 10X
After 1500 Passes



CHILLED IRON
No. 230 at Mag. 10X
After 50 Passes

At a large soil pipe foundry, accurate records were kept in a test comparing TRU-STEEL shot and chilled iron shot during a period of 104.5 wheel hours in cleaning soil pipe fittings in a 36″ x 42″ Wheelabrator Tumblast. Here are the results:

Breakdown Per Wheel Hour		Cost of Shot Consumed	
Chilled Iron	19.27 lbs.	**Chilled Iron**	$123.52
TRU-STEEL	3.349 lbs.	**TRU-STEEL**	42.88

SAVING (104.5 Wheel Hours) **$80.64**

*Name on request

American WHEELABRATOR & EQUIPMENT CORP.
505 S. BYRKIT ST. MISHAWAKA 2, INDIANA

PLEASE TURN PAGE

Let the WHEELABRATOR®

Top Left:
The cost of cleaning non-ferrous castings was reduced $7.06 per ton at Keystone Brass Works, Inc., by replacing a wet tumbling mill with this 27" x 36" Wheelabrator Tumblast. Annual saving: $3,883.00.

Lower Left:
In the cleaning of just one type of gray iron casting an annual saving of $7,310 was effected by the installation of this Wheelabrator Room at Love Bros., Inc.

COMPANY
LOVE BROTHERS Aurora, Ill.
WEST MICHIGAN STEEL FOUNDRY Muskegon, Mich.
KEYSTONE BRASS WORKS Erie, Pa.
SAWBROOK STEEL CASTING CO. Lockland, Ohio
THE MAJESTIC CO Huntington, Ind.
A Midwestern Malleable Foundry
A Prominent Midwestern Foundry

PLEASE TURN PAGE

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

American

pay you *Profits* like these

Greater production, less maintenance, lower operating costs, better cleaning quality, lower costs per ton . . . these are the vital points in which the Wheelabrator excels . . . and the reasons why most modern cleaning rooms depend upon Wheelabrators for profitable production.

Compare the Wheelabrator on a point-by-point basis of your own choice and see for yourself how it will revitalize your cleaning operations, return the investment promptly, and pay you attractive profits like those charted below.

To do this simply ask to have our nearest district engineer analyze the application of a Wheelabrator to your individual problem. His survey involves no obligations on your part, and you will find him capable, friendly and helpful.

CLEANING PROBLEM		CLEANING EQUIPMENT		SAVINGS		
TYPE OF WORK	PRODUCTION	FORMER METHOD	WHEELABRATOR METHOD	PER TON	PER DAY	YEARLY
GRAY IRON Runner Bars weighing 975 lbs. each for glass grinding machines	2125 tons yearly	Airblast Room	Car Type Room with Rotating Table	**$3.44**	**$29.24**	**$7,310**
STEEL castings weighing ¼ to 2800 lbs. each	1300 tons monthly	3 Airblast Rooms	60" x 96" Tumblast	**$1.15**	**$71.59**	**$17,898**
NON-FERROUS copper and brass fittings weighing 1 ounce to 10 lbs.	550 tons annually	Wet Tumbling Mill	27" x 36" Tumblast	**$7.06**	**$15.53**	**$3,883**
STEEL castings weighing from 1 lb. to over 1 ton each	30 tons daily	2 Airblast Rooms	72" Twin Table	**$1.37**	**$41.10**	**$10,275**
GRAY IRON furnace and building specialty castings	125 tons monthly	8 Tumbling Mills	66" Swing Table	**$6.35**	**$38.10**	**$9,525**
MALLEABLE castings weighing ½ to 50 lbs. each	4500 tons annually	4 Airblast Mills	48" x 42" Tumblast	**$1.19**	**$21.59**	**$5,398**
GRAY IRON cylinder blocks	per hour: 142 to 180 blocks with Wheelabrator (125 blocks before)	14 Tumbling Mills 1 Airblast Room	Monorail Cabinet	**.21** cents per block	**$110.16**	**$27,540**

PLEASE TURN PAGE

THIS IS THE RECORD AT SUPERIOR FOUNDRY, INC., CLEVELAND, OHIO

American DUSTUBE COLLECTOR

"No other piece of equipment in our foundry has such a favorable record"

HIGH PROFIT MARGIN

Mr. Ed. Horlicka, Foundry Supt.

"The high efficiency of the Dustube dust collector is reflected in the dust-free conditions in our cleaning room. This results in making our foundry a happier, healthier place to work — it increases productivity. Profit margins are greater because the Dustube costs so little to operate and maintain. We know that it costs only a few cents a day to operate for which many dollars are returned."

HIGH EFFICIENCY

Mr. James Risak, Cleaning Room Foreman

"Dependable, rugged service, high efficiency and economy of operation are the reasons for our satisfaction with the Dustube dust collector. In spite of the heavy dust concentration in the blast cabinet due to the quantity of abrasive involved and the sandy condition of the castings, no dust escapes into the atmosphere."

LOW COST MAINTENANCE

Mr. Emil Lukac, Maintenance

"Dustube's simplicity of design appeals to our maintenance crew since thorough inspection is so simple and rapid—no other piece of equipment in our foundry has such a favorable record. The automatic and efficient shaking of the cloth tubes thoroughly removes all dust without any cloth wear. If all our production equipment was as trouble-free, operating a plant would be comparatively simple."

DUSTUBE ADVANTAGES

BETTER DUST REMOVAL — Simple, fast, thorough. Shortens cleaning time.

POWER SAVINGS — Lower resistance to air flow. Lower air velocities.

HIGH EFFICIENCY — Nearly 100% efficient by convincing tests.

EASE OF INSPECTION — Clean, safe, simple, no parts to remove.

LESS FILTER WEAR — No abrading metal contact. Easy to ship, store and handle.

FASTER FILTER REPLACEMENT — Takes only a few seconds. Requires no tools.

PLEASE TURN PAGE

American WHEELABRATOR & EQUIPMENT CORP.

505 S. BYRKIT ST. MISHAWAKA 2, INDIANA

CUT Core Making Time From Days to Minutes!

YOU CAN ELIMINATE the three costly steps shown in the chart at right using the *Foundromatic* Sand Core dryer. This means you no longer need start making cores days or weeks ahead of time unless you want to. With this new unit, cores are ready for the molder immediately after leaving the dryer . . . minutes after leaving the core maker.

SAVE 80% TIME PLUS FUEL

Even figured on the basis of the drying operation alone, you save at least 80% in time. Add to this, fuel savings of 30 to 80% (depending on the type of fuel and binder you are now using) and you begin to see the tremendous advantage of this revolutionary new system.

NO OVERBAKING OF CORES

You eliminate burning of fins or thin sections of cores . . . reduce rejects. Working conditions are improved too. Fumes and heat are eliminated from core room.

Any core that will pass through an aperture 13 in. high and 36 in. wide can be dried by the standard Sand Core dryer.

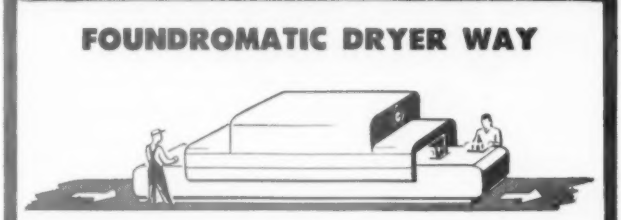
PROVED IN A-C'S OWN FOUNDRIES

Allis-Chalmers engineers will gladly study your core requirements and recommend proper equipment to fit your production set-up. Their advice is based on several years operation in A-C's own huge foundries. Call your nearby A-C Sales Office, or write direct.

A-2985

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Foundromatic is an Allis-Chalmers trademark.



3 STEPS YOU CAN ELIMINATE

Eliminating these 3 steps with the *Foundromatic* Sand Core dryer means you cut core making time from days to minutes.

1. Eliminate collecting racks. Cores are placed directly onto the moving conveyor belt of the *Foundromatic* Sand Core dryer.

2. Eliminate cooling racks. When cores come out of dryer, they're cool enough to be handled bare-handed.

3. Eliminate curing and storage racks. Cores can be made as needed in a matter of minutes, without building stocks on curing and storage racks.

ALLIS-CHALMERS

Ferro-alloys for accurate melting control

Ferro-Silicon

25% 50% 65% 75% 85% 90%

Covering every silicon requirement in the production of iron and steel.

Special Blocking 50% Ferro-Silicon

Specially designed and treated for blocking open hearth heats.

Low Carbon Ferro-Chrome Silicon

Spec. .06% Max. Carbon, 38-42% Chrome, 38-42% Silicon. Used in production of high chrome steels low in carbon.

Ferro-Manganese

Standard High Carbon Grade . . . an assured source of supply.

High Carbon Ferro-Chrome

4-7% Carbon, 65-70% Chrome, for chrome additions in making alloy steels.

Borosil

3-4% Boron, 38-42% Silicon; balance iron, for controlled boron additions to steel.

Simanal

An ideal deoxidizer for fine grained steels and steel castings.

Manganese Sulphide

53-55% Manganese, 27-30% Sulphur, balance iron. Ladle addition for low cost production of free machining steels.

PITTO © OFA 1935 RAINIER © OFA 1941

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

BRIQUETS
SILICON • MANGANESE • CHROME
SILICO-MANGANESE

Use this Electric Coke Igniter

The Fast, Smokeless Way to start a cupola

Foundrymen are hailing the Whiting-Mason Electric Coke Igniter as the solution to an age-old, vexing problem. It ignites the cupola thoroughly in about 30 minutes, without the use of either wood, gas or oil—and at lower cost than any other method.

Because no wood is used, there is *no smoke* during the burning-in period—no "bridging of coke" to cause cold iron on first tap—no danger of runouts from a punctured sand bed.

A Whiting representative will gladly demonstrate this equipment in your foundry—show you how it can quickly save its cost in kindling, time and labor costs. Write, today, to make arrangements.

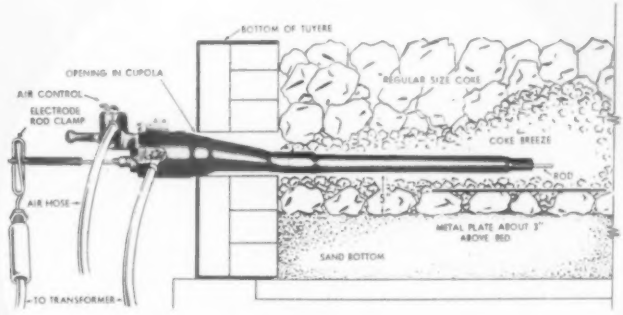


Diagram showing how Whiting-Mason Electric Igniter is applied to the cupola. 20 seconds after the arc is struck, vibrator tube and electrode holder are withdrawn, and a blast pipe is inserted. Igniter is 45 inches long, weighs 22 pounds.

WHITING
CORPORATION

15607 Lathrop Ave. Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

THIS HINES

HAD TO

THE DRAG

15" x 50" x 4"

HINES ALUMINUM DRAG FLASK . .	46 lbs.
BOTTOM BOARD .	32 lbs.
SAND	148 lbs.
Total Weight . .	226 lbs.

A LIFT OF 113 LBS. PER MAN

A flask this size does involve a substantial amount of sand and therefore must be sturdy and rigid enough to maintain its accuracy under the resulting heavy pressures. The Hines ALUMINUM "Pop-Off" Flask on this job met all requirements and still was handled easily by hand.

HINES POP-OFF (Trademark Reg. U. S. Pat. Off.) FLASK

BUILDERS OF FLASKS AND JACKETS EXCLUSIVELY FO

THE HINES

3431 WEST 140th ST.

ALUMINUM "POP-OFF" FLASK

TO BE STRONG · STIFF · RUGGED

THE COPE
15" x 50" x 6"

HINES ALUMINUM COPE FLASK	77 lbs.
SAND	221 lbs.
Total Weight	298 lbs.

Note how easily this cope is handled by hand in the illustration above. Sand was the only weight factor here.

A LIFT OF 149 LBS. PER MAN

FOR OVER TWENTY-FIVE YEARS

FLASK CO.

CLEVELAND 11, OHIO

it's NEW

it's MORE COMFORTABLE

it's RUGGED

AO 5X264 Heavy Duty Glove

Feel it, test it, wear it and you'll see why this latest addition to the AO steel stapled line is ideal for handling small castings, rough stock, grinding and similar work.

Made of specially treated chrome tanned cowhide leather for long wear, the glove features a canvas back with elastic strap to overcome hand fatigue while providing a cooler feeling and snug fit.

All seams are steel sewed and the seam along the forefinger has been eliminated for longer glove life and added comfort at this vulnerable point.

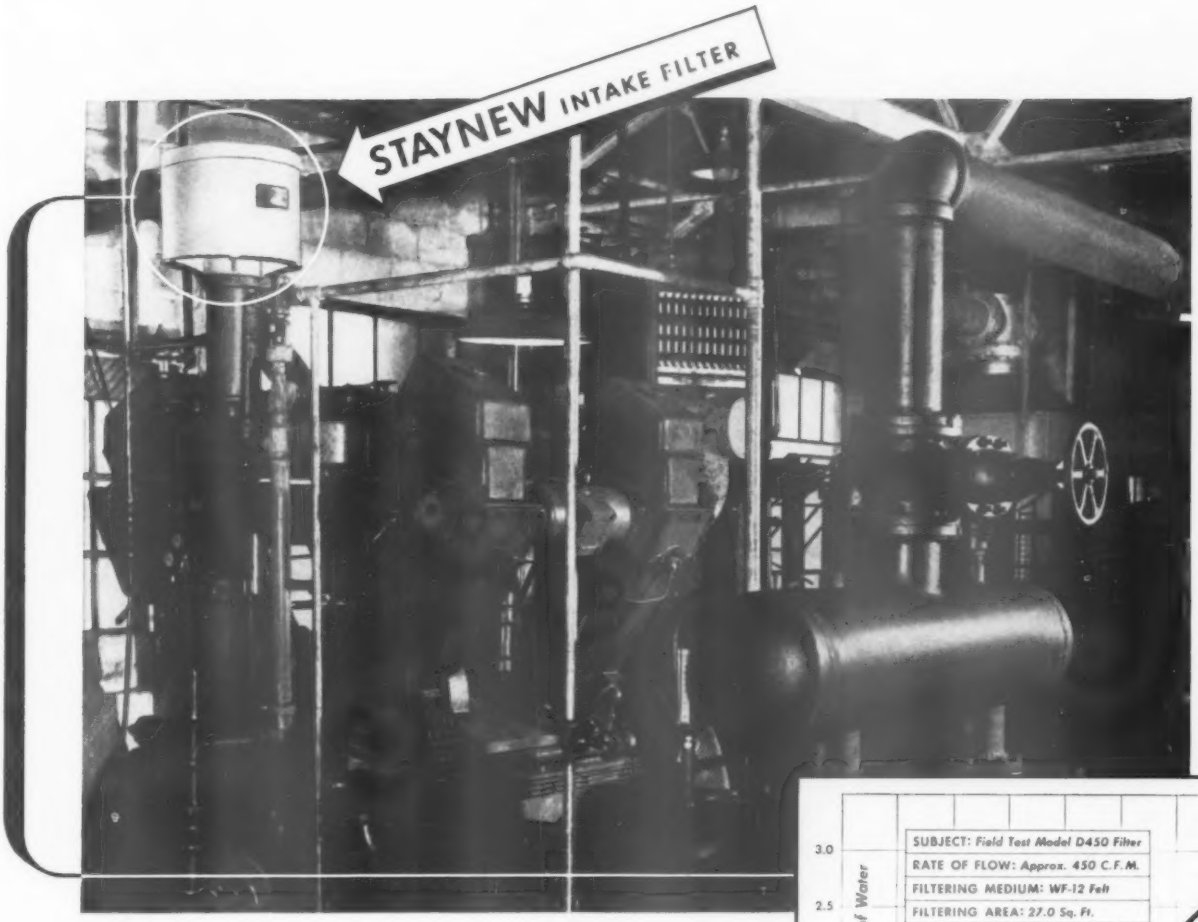
Wearing surface of the palm has also been increased by extending the palm — no bib patch — another comfort feature.

The steel stapled strap at the thumb crotch fortifies one of the weakest parts of a glove. There is a steel stapled patch on face of thumb and a short cufflex cuff with tape binding.

You'll lower your glove costs with the 5X264 — ask your AO Safety Representative or inquire at your nearest AO Branch Office.

American Optical COMPANY Safety Division

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



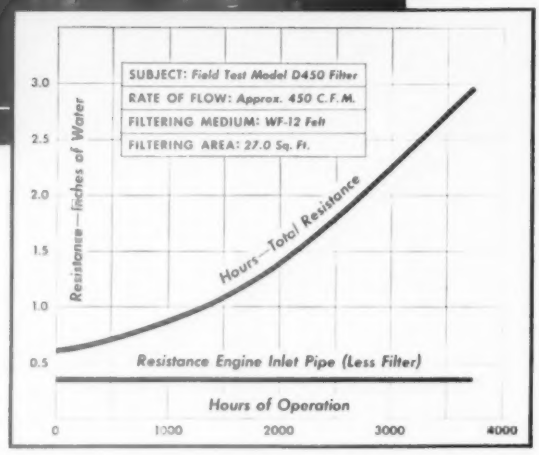
3761 HOURS CONTINUOUS OPERATION WITHOUT ATTENTION

Yet Filter Resistance Is Only 2.73 Inches of Water

This filter, installed on a Diesel-powered compressor, operates under unusually severe conditions. Intake air is heavily loaded with dust and oil; the dust due to the close proximity of a railroad siding where bulk lime, sand, and coal are handled—the oil to two additional Diesel-powered compressors operating in the same room.

Such a case history is not unusual. Reports are frequently received of Staynew Filters operating under less severe conditions for two or more years without attention—with the initially high efficiency rising as dust load increases.

Ease of cleaning as well as infrequency of cleaning is also an important feature, requiring only a few minutes with the specially designed Staynew Cleaning Nozzle.



More and more experienced operators of compressor and engine equipment specify Staynew Intake Filters—not only because of the minimum attention required, but also because these filters:

- ★ **Provide positive protection**
- ★ **Require no pre-coat or filter aid**
- ★ **Are unaffected by extremes of temperature**
- ★ **Permit use of oversize filters (air velocity not critical)**
- ★ **Are ideal for use with carbon ring compressors**

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER CORPORATION

36 CENTRE PK., ROCHESTER 3, N. Y.

Representatives in Principal Cities

The 3′ x 6′ Model C,
Single Deck Screen

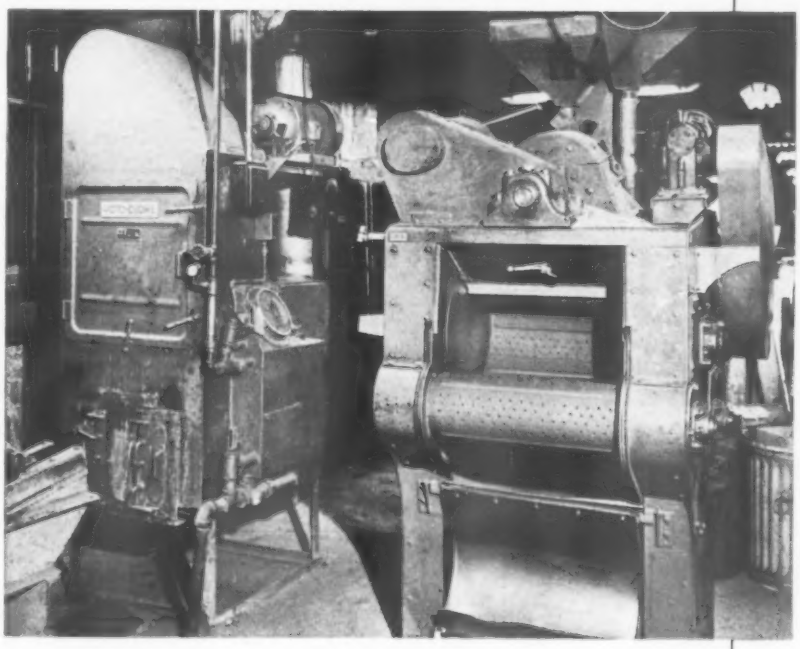
The biggest screen for the smallest dollar

The Simplicity 3′ x 6′ Model C Single Deck Screen is without question the biggest screen value available on the market today, and it has always been the lowest priced screen of real capacity ever offered. The 3′ x 6′ screen *actually gives 3′ x 6′* — 18 square feet — of screening area with the famous Simplicity Gyrating Action. This Model C single deck screen is a standard unit *built for service in any industry*. Ideal for cleaning up a dirty stockpile or for making an extra size product outside your regular screening operations. The 3′ x 6′ Model C has all the work-proved Simplicity features, yet is a compact unit that can be installed in your foundry at a saving you won't find elsewhere.

Sales representatives in all parts of the U. S. A.
FOR CANADA: Canadian Bridge Engineering Co. Ltd., Wallaceville, Ontario.
FOR EXPORT: Brown and Rice, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY • DURAND, MICHIGAN

Here's the source and solution of a dust problem side by side



● This illustration gives proof to the statement, "There's always room for a Roto-Clone". At right, you see an abrasive cleaner which is a high volume dust producer. At left, you see a Type N Roto-Clone* which serves this unit. And the one thing you don't see is dust.

Like all Roto-Clones, compact, space-saving design is a feature of the Type N unit. And it's death on dust! This Hydro-Static Precipitator delivers high efficiency dust separation and collection by a combination of centrifugal force and thorough scrubbing of the air by a water curtain. Exhausting a constant air volume assures effective dust control at all times. There are no secondary dust problems as the Type N discharges the collected material as a sludge for easy disposal.

Don't penalize the efficiency of your operation through lack of proper dust control. It's simple and sure the Roto-Clone way. There's a type and size for every job that can be fitted into your present setup quickly and easily. For complete information, call your local AAF representative or write direct to

AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

®AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

Famous Ampco Alloys

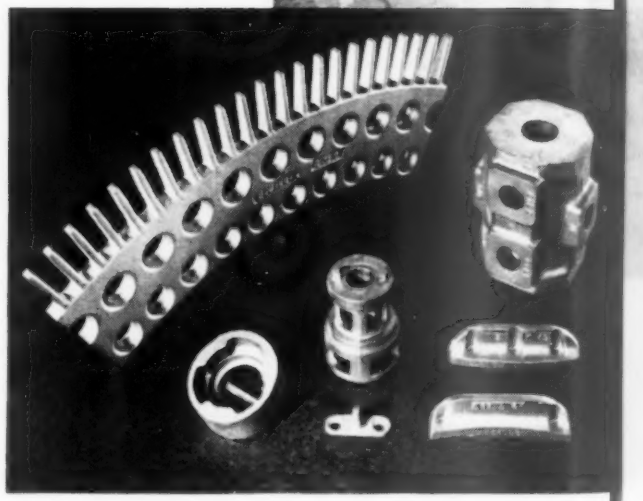
start here . . .

Detroit ROCKING Electric Furnaces deliver uniform high-quality melts

AMPCO METAL, INC., of Milwaukee, is famed the world over for its bronze alloy, Ampco Metal, and for other copper-base alloys. It is the foremost copper-base alloy plant in the U. S. specializing in refractory bronze alloys.

Ampco Gets Top Results

Ampco relies on its battery of Detroit Rocking Electric Furnaces to produce high-quality melts economically, to customers' rigid specifications. The rocking or "stirring" action of the furnaces always assures homogeneity. Neutral atmospheres maintained in the chambers minimize oxidation losses and inclusion of oxides in finished castings. Result: Ampco castings are of superior grain structure, show fine surface texture, are uniform in color, and show low scrap loss when machined.



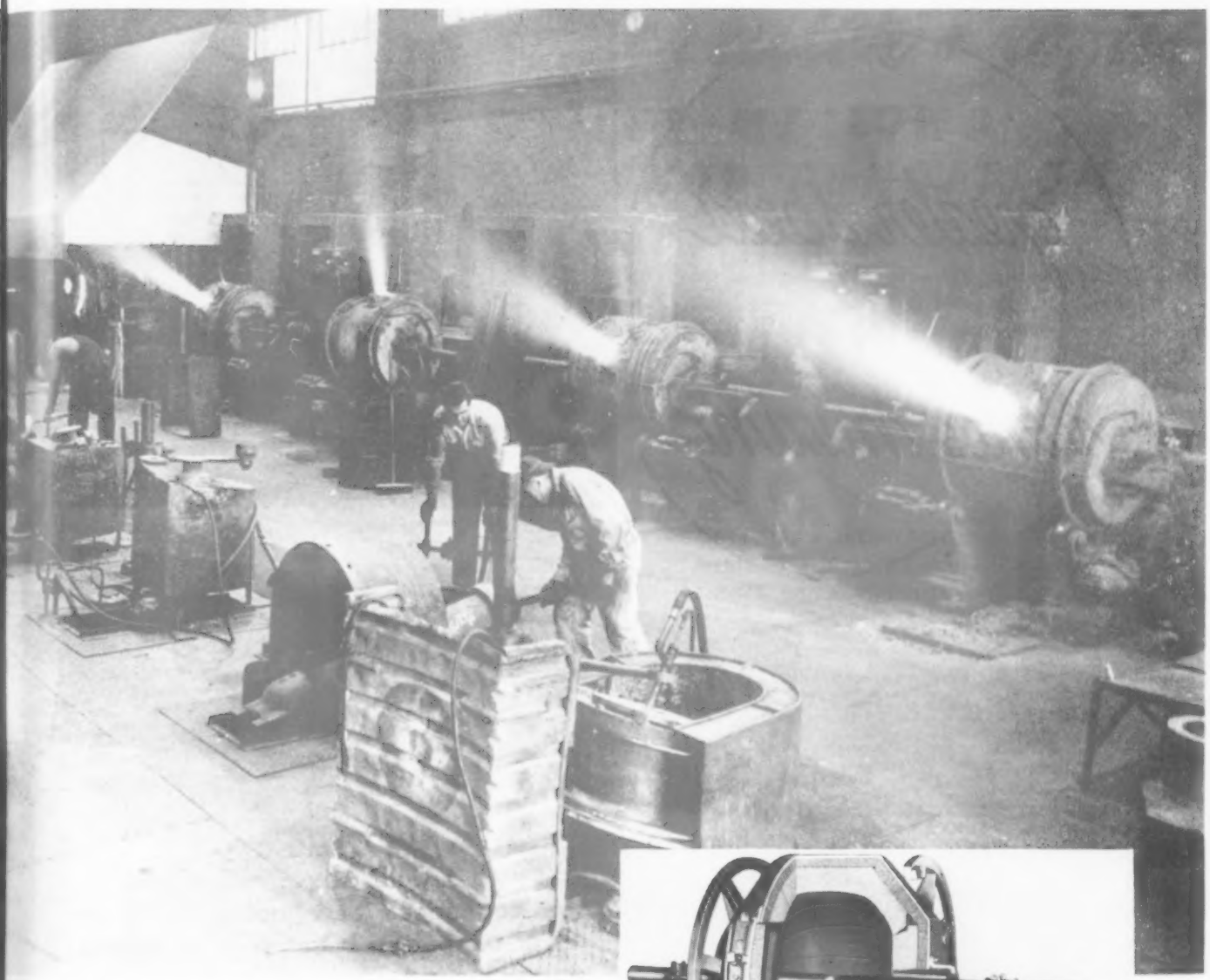
To produce high quality alloys to make castings such as these, Ampco bought its first Detroit Rocking Electric Furnace in 1924 . . . today, Ampco has a huge battery of Detroit Electric Furnaces!

For Ferrous Melting, Too

In ferrous melting operations, too, Detroit Rocking Electric Furnaces positively control composition and quality, and reduce metal shrinkage. Turnings, scraps and machinings are melted profitably, even when *no pigs* are used!

Detroit Electric Furnace rocking cycles are adjustable, and can be pre-set. Duplication of previous melts is remarkably easy. The electrodes always remain clear of the molten bath

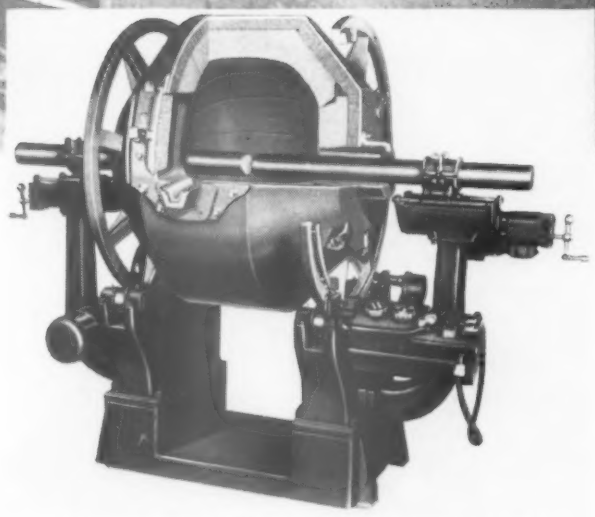
Low MELTING COST
High QUALITY CONTROL
FOR FERROUS and NON-FERROUS METALS



for optimum power use, and to avoid carbon pick-up. All-electric operation ends worry over fuel shortages, ends, too, the cost of handling and storing bulky fuels. Detroit Electric Furnaces are available in 10 to 4000 lbs. capacities, with conical or cylindrical chambers which are easily, quickly replaceable.

Write for Savings!

For facts on how you save costs, get more high-quality melts per day, send us your production data. Our engineers will supply facts on Detroit Rocking Electric Furnaces that can save you money in your own foundry operation. Write today!



Cutaway of a Detroit Rocking Electric Furnace showing position of electrodes and the refractory lining. Note thick insulation which retains all the heat for melting, keeps foundry area temperatures low.

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: In BRAZIL—Equipamentos Industrias "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y., MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.

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greater speed

IN

sand mixing

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The Clearfield Mixer offers you increased speed and thoroughness in sand tempering because of its unique revolving pan and vertically rotating muller principle of operation. Because the mullers are stationary in the horizontal plane they exert a twisting, sliding movement on the sand which rubs or smears the bond on the grains of sand. This action substantially reduces the tempering period and results in sand that is thoroughly and uniformly bonded.

Clearfield Mixers are available in capacities to meet any sand preparation need. Write today for Catalog No. 79 for details.

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AERATES

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MACHINE COMPANY

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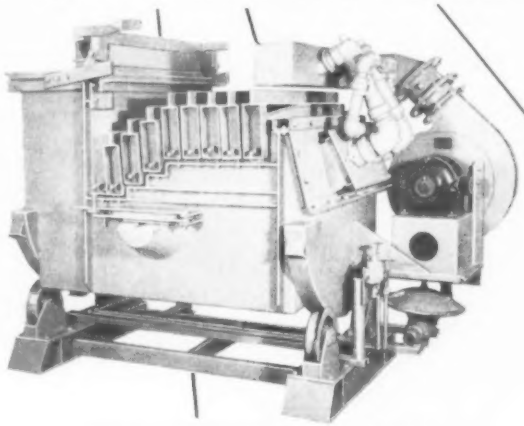
PENNSYLVANIA, U. S. A.

4 WAYS TO *Greater Profits*

...FASTER MELTING ...BETTER SHOP CONDITIONS!

These four leading Stroman Furnaces are merely a part of the tremendous complete line of furnaces that Stroman makes for use in Foundries, Die Casting, Permanent Mold and Sand Casting Plants. Remember . . . Stroman builds any type or size furnace for any or all size melting problems. Each type furnace does its job exceptionally well, assuring lowest fuel costs, easiest operation, fastest melting and longest life. They are the furnaces you should consider above all others, for they are the acknowledged leaders in the field. Send your melting room problems to Stroman today . . . their engineers, who are qualified experts in melting room procedure and layout, will be only too glad to consult with you and offer suggestions for improvements and savings.

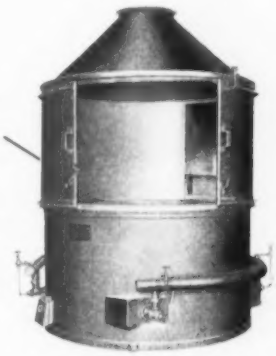


ECONOMELT FURNACES

The finest direct fired reverberatory melting furnace ever offered. Melting speed for Brass, Bronze, Grey Iron or Aluminum is unmatched. Continuous charging. Cold metal does not reach the molten bath causing it to chill. All metal is preheated and melts in suspension. This furnace shows upward of 40% savings in fuel costs. Oil, gas or combination oil-gas fire. Capacities (Brass or Iron) up to 6000 lbs. Write for Bulletin 635 giving full information.

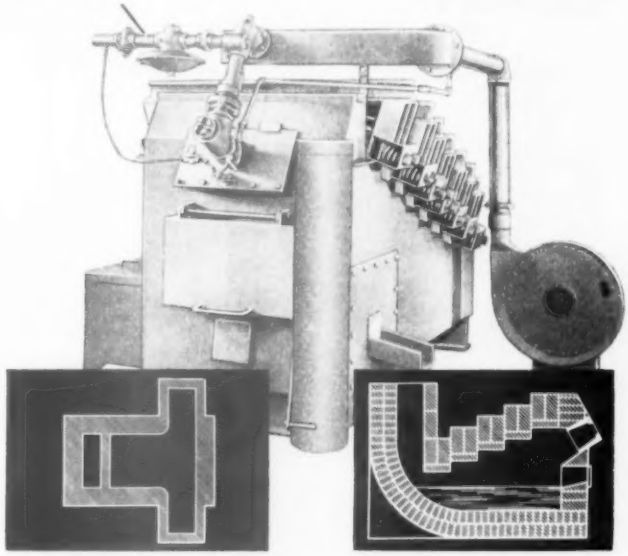
STROMAN RM STATIONARY CRUCIBLE MELTING AND HOLDING FURNACES FOR ALUMINUM

Built especially for use in permanent mold and die casting plants where molten metal is dipped from furnace with a hand ladle. Melting is done in crucible (no iron pick-up). Thoroughly insulated to protect the operator from heat. Oil, gas or combination oil-gas fire. Capacities, 200 to 800 lbs. Available with full automatic controls.



STROMAN IRON POT MELTING FURNACES FOR ZINC OR ALUMINUM

These furnaces are highly recommended as breakdown furnaces for zinc and aluminum die casting and permanent mold plants. They also excel as holding furnaces. They can be supplied either with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of automatic or manual controls and oil or gas fire. Capacities from 212 to 14,000 lbs. zinc.



Horizontal view showing 2 dip-out boxes.

Vertical view showing combustion chamber, metal bath, charging hopper and clean out door.

STROMAN MODEL MC ALUMINUM REVERBERATORY DIP-OUT FURNACE

It's New! Continuous charging and pouring make it without equal in low fuel and maintenance costs plus quality castings. Two Stromans in one . . . the combination of breakdown and holding furnaces makes this the most economical furnace ever designed for aluminum melting. It can be used for melting, holding, alloying fluxing for either casting or producing ingots. Cold metal does not reach the molten bath. Hot metal is always available for dipping. No iron pots or crucibles to buy. Bath capacities range from 500 to 10,000 lbs. Oil, gas or combination oil-gas fire.

Write for Complete Information at Once

STROMAN FURNACE & ENGINEERING CO.

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WELD GRINDING

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TRADE MARK

For EXTRA LONG WHEEL LIFE, versatility, fast cutting, here's your answer . . . Fibrex Red Wheels. They're strong, tough durable for truly outstanding action in heading into welds, removing flash and bead and cleaning up rough ragged surfaces, especially on stainless steel.

Depressed Center Wheels (with adaptor) for all portable disc sanders and right angle grinders . . . straight wheels for cutting and all purpose grinding with regular equipment. Your choice of grain sizes . . . 16, 24, 36, 50 or 80. Send now for Bulletin ESA 186 giving full details on these new and amazingly versatile abrasive tools.

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DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

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FREE!

Here's basic information about aluminum casting alloys from Federated Metals, first in the non-ferrous field.

In simple, easy-to-read style it tells how to pour . . . how to avoid shrinkage, excessive dross, cracks in castings, gas absorption . . . how aluminum casting alloys are affected by copper, silicon, magnesium, manganese, iron, zinc, nickel, titanium . . . solution treating . . . aging . . . stress relief . . . corrosion . . . and test bars . . . all thoroughly covered.

A complete list of Federated Aluminum Casting Alloys for sand, permanent mold and die casting — with mechanical and industrial properties — is included.

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120 Broadway, New York 5, N.Y.
Send me a copy of Aluminum Casting Alloys.

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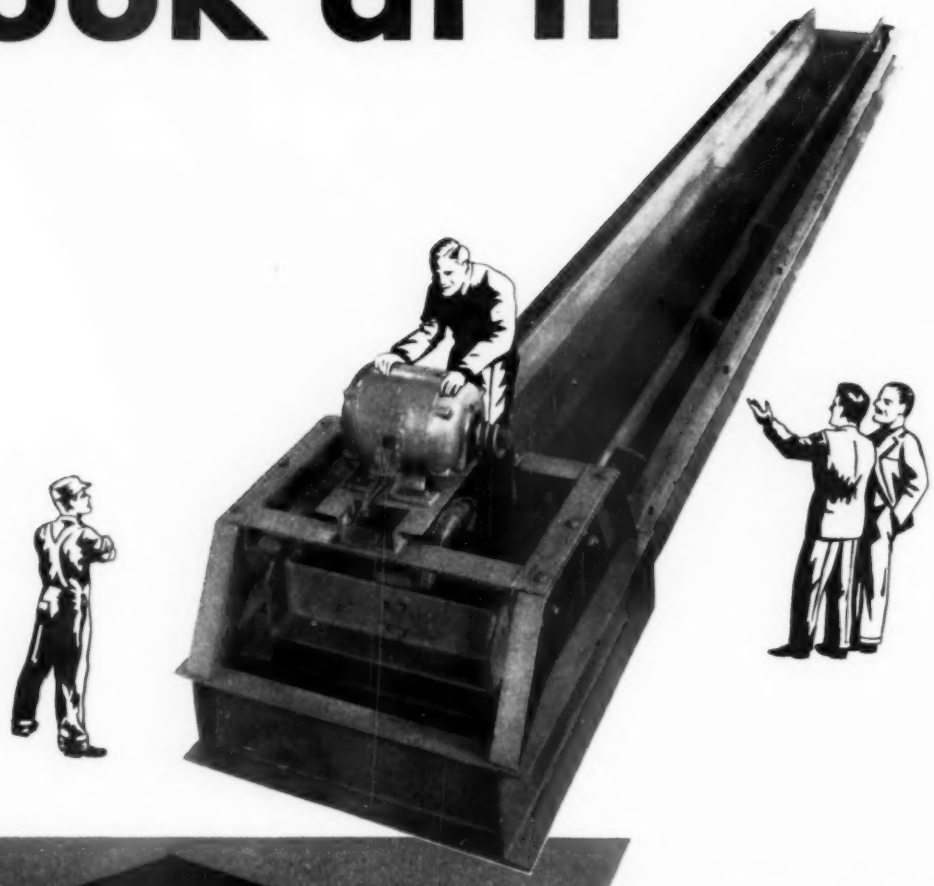
every way you look at it



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are one of your best Material Handling Answers

● According to cost figures, surveys, editorial comment and common sense,– the best way to cut cost today is to cut the cost of materials handling.

Ajax Lo-Veyors give you a complete, self-contained means of conveying dry aggregates (bulk materials). Use of the Ajax-Shaler Shaker provides a reciprocating drive which eliminates dozens of idler bearings, head and tail pulleys and eccentric shafts.

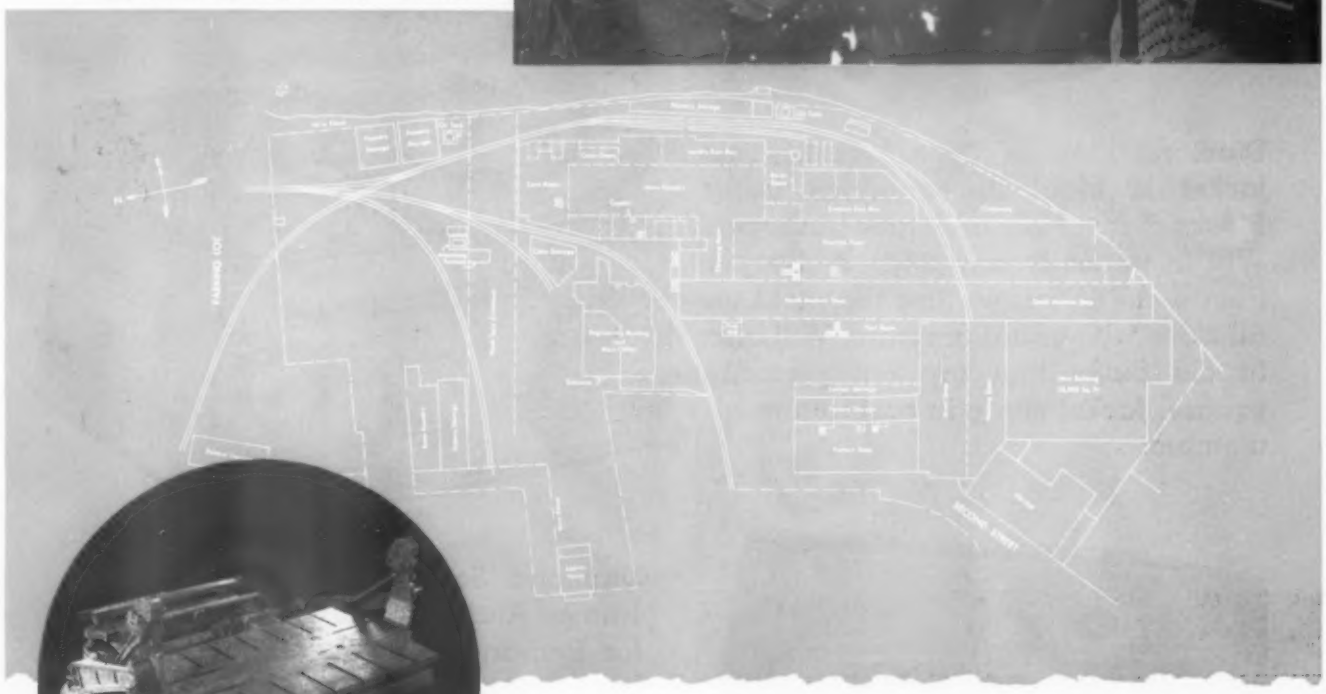
Ajax Lo-Veyors are available in open and closed pan and tubular types. They provide gas tight construction for critical processes and explosive operations.

Widely used by leading foundries. Write giving outline of your requirements.

AJAX FLEXIBLE COUPLING CO. INC., 204 English St., WESTFIELD, N.Y.

This Foundry is a Good Place To Work

BELOIT IRON WORKS, BELOIT, WISCONSIN



WHY? Because it has a background of 92 years' progressive thinking and growth; long-time employment characterizes the plant's more than 1,200 men and women; because of its reputation for quality work (Beloit papermaking machines are operating in mills throughout the world).

Beloit's engineering achievements are highlighted by a long line of "firsts", recently including the largest cylinder board machine in the world; the 12-acre plant has complete facilities to carry out efficiency-in-production, employee safety, management-labor relations, good housekeeping and good management programs.

Herman jarr rollover machines used in this plant help make it a good place to work. They're easy to operate, since one rotary valve handle does the job . . . timer is automatic . . . lubrication is automatic . . . and careful engineering guarantees long production runs.

Herman machines, made in capacities up to and including 140,000 lbs., have made their way by the way they're made.

Herman **MOLDING MACHINES**

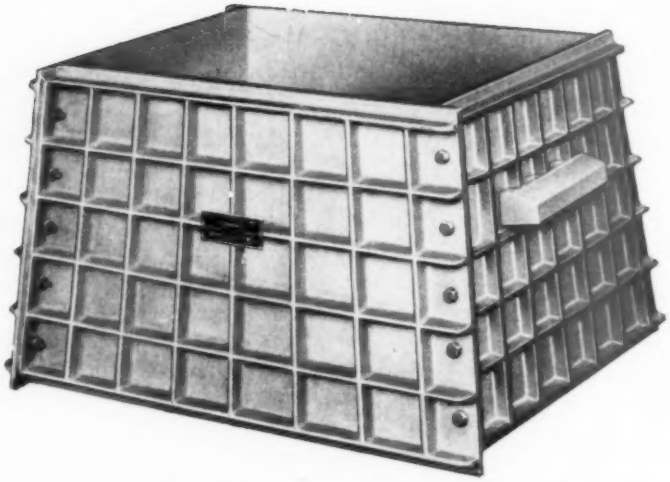
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

A COMPLETE LINE TO CHOOSE FROM.....

DIAMOND

Aluminum, Grey Iron and Steel Jackets

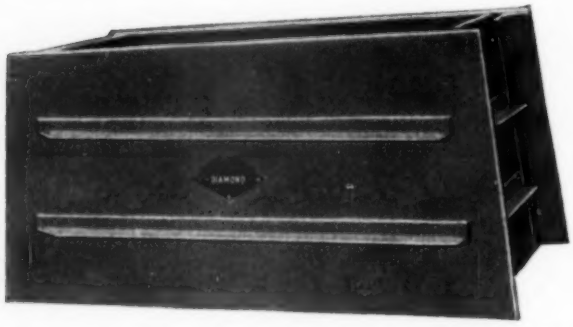
Diamond Flexible Type Jacket. This jacket is ideal in Foundries using Flasks of a variety of degrees in taper. Will fit perfectly any degree of taper from 3° to 6°, supporting the mold on all sides with equal pressure. Will also fit old flasks that are not perfectly square. Jacket made in cast iron or aluminum.



Diamond Solid Type Jacket in Cast Iron or Aluminum. Made in aluminum for foundries desiring a light weight but sturdy jacket for medium weight castings.

Made in cast iron for heavy duty iron and steel castings.

All jackets are assembled on special designed templates in 3°, 4°, 5° tapers and are guaranteed to fit correctly.



This is the widely known DIAMOND Steel Jacket used by foundries since 1908. Thousands are in use today.

DIAMOND

Telephone 2553 **CLAMP AND FLASK COMPANY** **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

SNAPPY ACTOR ...RAMS CORES FASTER

THIS new Rotor No. 22-B Sand Rammer in this foundry is blasting costs because it hard-packs core sand much faster than previous rammers. Its blows are fast and snappy.

Have you investigated the new Rotor Rammers for your work? There's a type for every job . . . light or heavy duty . . . bench or floor model. Write for a free copy of Bulletin No. 32.

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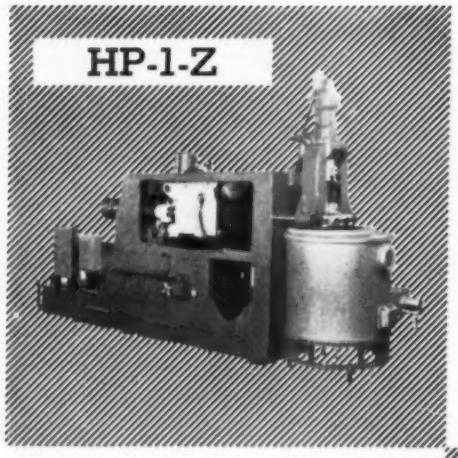
RAMMERS

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

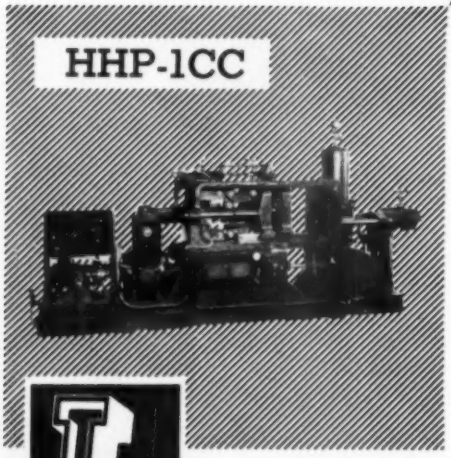
NOW IS THE TIME TO *Check!*

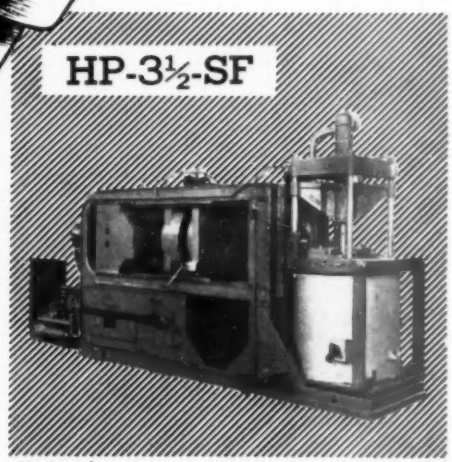


Whatever your plan is for future operations, like any good chess player, you will want to check. Yes, check your needs . . . and our specifications!

The complete line of Lester-Phoenix Die Casting Machines offers a model for every type of operation. For aluminum, there are the famous "Prefill" machines in a range of capacities. And the new HP-1-Z culminates years of bringing you the latest advances in zinc die casting.

Yes, in die casting as in chess, your plan must include operating with the best pieces all of the time. There is no better die casting equipment than Lester-Phoenix Die Casting Machines. CHECK!





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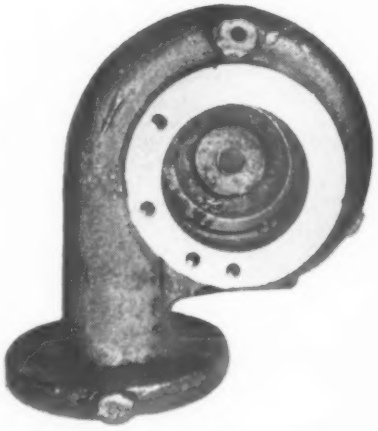
Rewarding work!

NI-ROD saves iron castings . . . makes *machinable* welds



But for Ni-Rod electrodes, this pump body would have been scrapped at the foundry. The built-up area of the flange facing is almost indistinguishable from the original cast iron. Machining, drilling and tapping of the Ni-Rod weld deposit were no more difficult than similar operations in cast iron.

In the photograph above, you see a 45-pound gray iron pump casing that was rejected because a small area of the flange failed to fill during pouring.

Instead of being scrapped, the casting was sent to the plant's welding department. There, with Ni-Rod® electrodes, the defective flange was built up and the repaired casting was passed to the machine shop where it was finished like a regular production piece.

Salvage operations like this with Ni-Rod save time and money.

Ni-Rod gives fast, crack-free, non-porous welds that are a close color match for gray iron . . . and welds that are as *machinable* as the iron itself. Slag removal is easy. And Ni-Rod is stable-arcing in all positions with either AC or DC current.

Another important Ni-Rod feature . . . preheating or post-heating is seldom necessary.

Why not try Ni-Rod in your own shop . . . soon? Discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they've tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

FREE — 8-page booklet:
"NI-ROD . . . a new electrode for any cast iron welding."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

For welds you've never been able to make before . . . in high-phosphorus irons; heavy sections—

NI-ROD "55"

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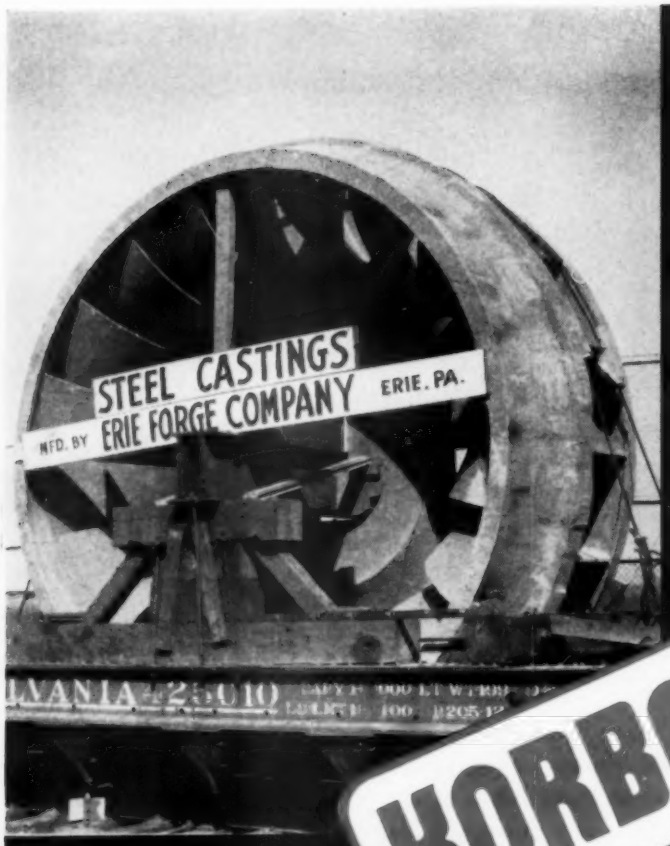
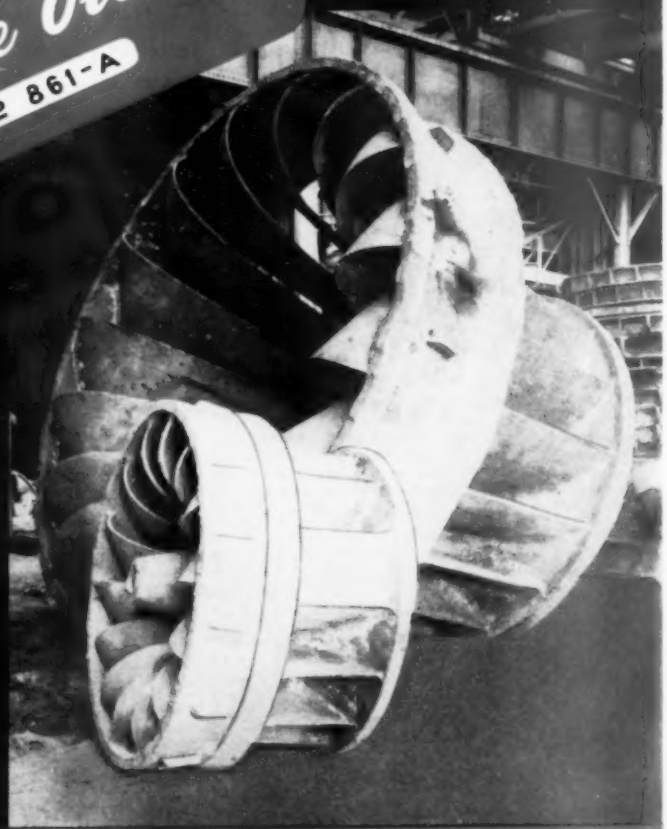


CASTINGS for Hydro Electric Plants as large as these Cast Steel Runners are being made regularly with our KORBOND CORE OILS at the plant of the Erie Forge Co., Erie, Pa. The casting to the left is 16 feet 7½ inches in diameter and weighs 124,190 pounds. Castings like these help run the power plant at Hoover Dam.

KORBOND
core oil
№ 861-A

KORBOND CORE OIL can be counted on for big jobs as well as the smaller ones. There is a grade to suit your particular type of work. It will not only suit your oven controls but will actually save money for the core room. Find out what KORBOND can do for you. Write for the story.



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1429 WALNUT STREET, ERIE, PA.

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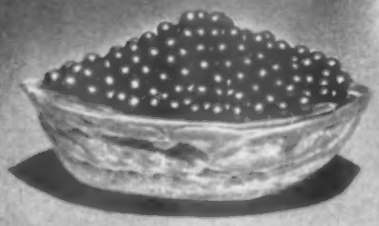
to faster, better, uniform, low-cost blast cleaning

IN A NUTSHELL

METALLIC

SHOT **HI-GRADE** GRIT



That's a broad claim. We don't expect you to accept it without substantiation. We hope you will ask us to present our proof. All we ask, is that you let it be on-*your*-job proof. Proof we know you'll believe! The only proof we want you to accept.

Like many production finishing men, perhaps you have always taken shot and grit pretty much for granted. If so, you have a surprise coming, for Hi-Grade Shot and Grit IS different—so superior, in so many ways—you can only appreciate its true value by job-testing the material yourself. That way you get proof of performance you can accept as conclusive. Order a trial quantity today. We'll let results speak for themselves. You'll find they say, "*Hi-Grade is best by test*"—your answer to faster, better, uniform, low-cost blast cleaning, in a nutshell.

Packed in 100 lb. Bags—Ready For Immediate Shipment

YOU GET TO THE MEAT OF HARD-TO-CRACK BLAST CLEANING PROBLEMS FASTER WITH

HI-GRADE SHOT AND GRIT

- **YOU GET MORE EFFICIENT PEENING AND CLEANING.** Hi-Grade Shot and Grit is uniform, especially processed to withstand repeated strain, stress and wear.
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- **YOU GET A LOWERED COST PER TON OF CASTINGS CLEANED** because Hi-Grade Shot and Grit has a longer re-use value. Special alloying and tempering process minimizes impact fractures.

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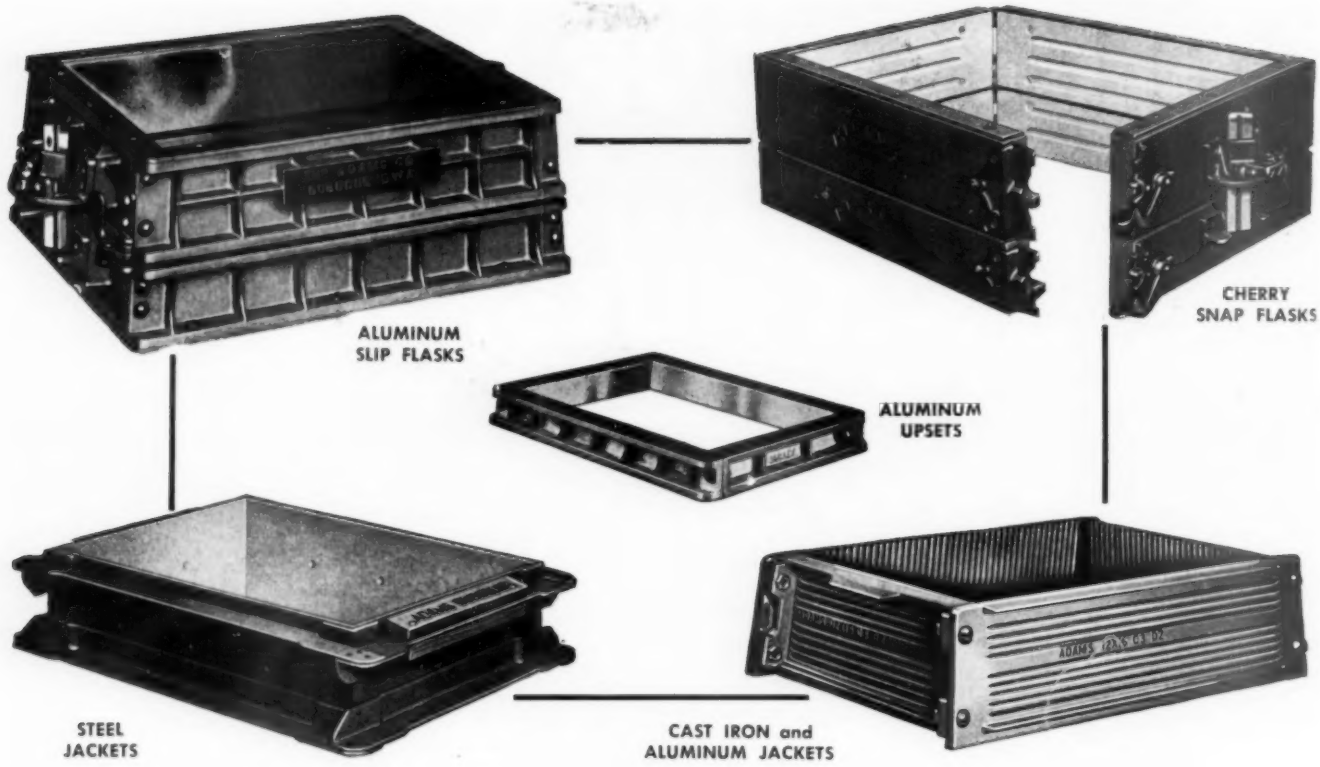

Precision Equipment for Precision Work

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- Cherry Slip Flasks
- Aluminum Slip Flasks
- Easy-Off Flasks
- Cherry Presser Boards
- Wood Bottom Boards
- Steel Bottom Plates
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- Aluminum Jackets
- Cast Iron Jackets
- Steel Bands
- Steel Upsets
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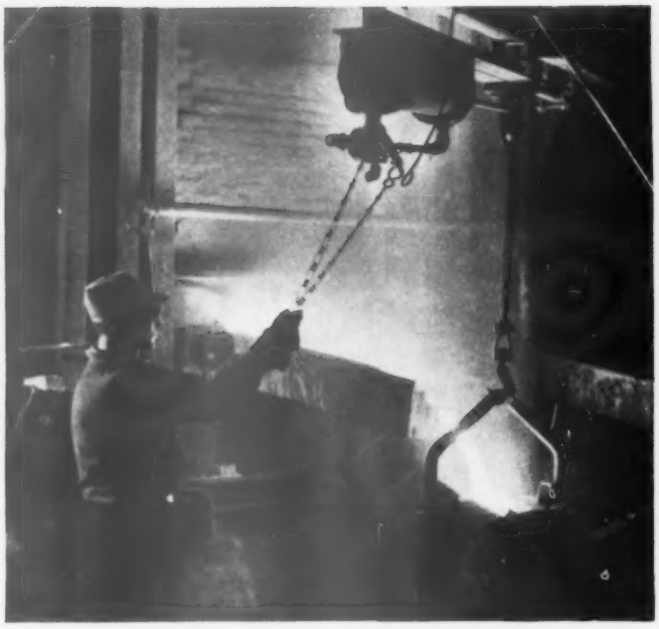

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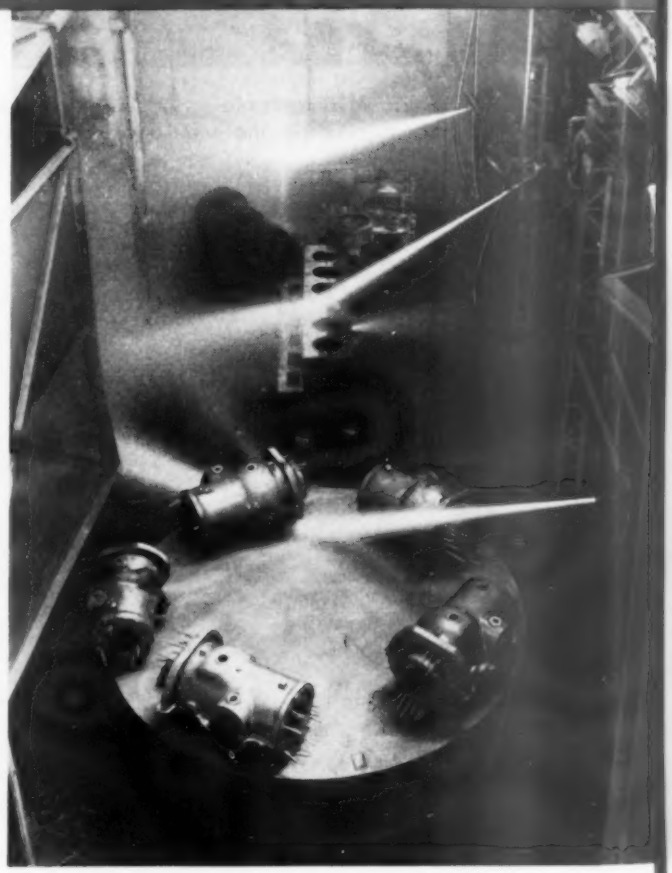

Three guns in operation, controlled from outside the enclosure. "Castings are so clean they look cadmium-plated" says a pleased executive.

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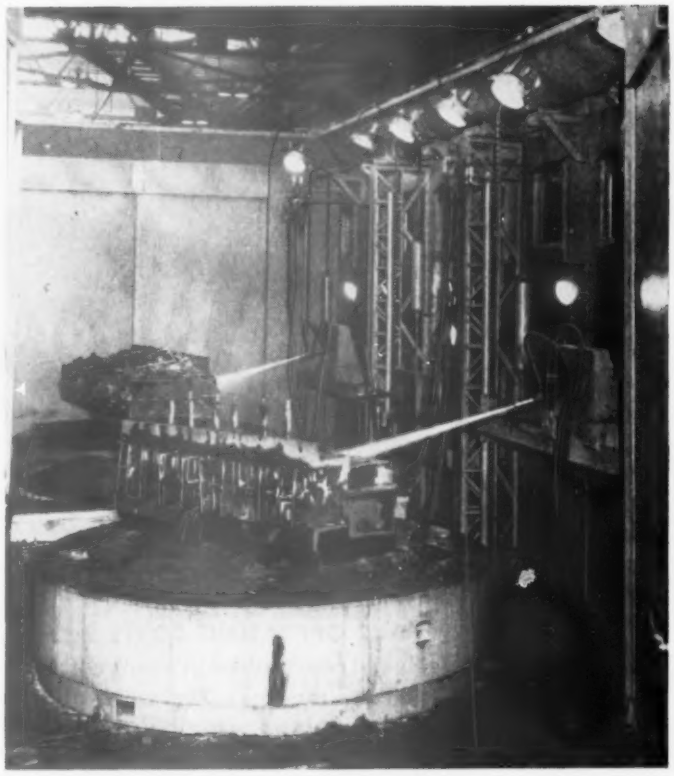
Removing a clean casting. Comparison with the worker indicates size of the room and turn-tables.



Two guns blasting large cylinder-block castings. Sand and water pass through floor gratings.

This center section can be partitioned off as a separate cleaning room.

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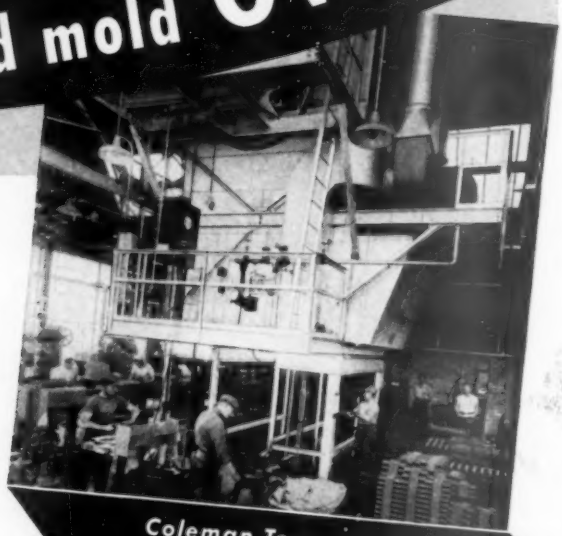
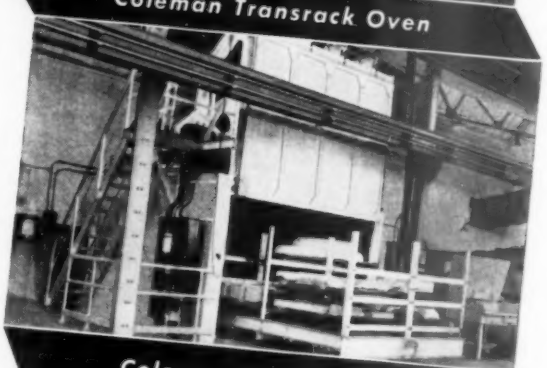


Coleman Tower Oven

Coleman Transrack Oven



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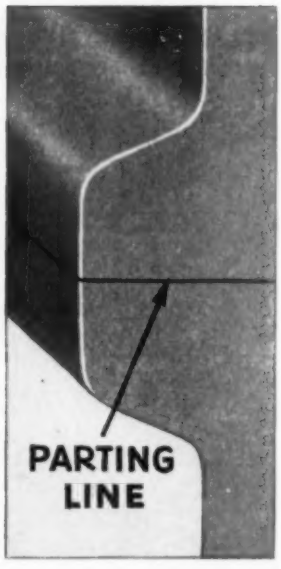

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Need NSRB Chairman For Security Planning

IN SOLVING production and procurement problems in a war emergency, this nation has found it expedient, if not mandatory, for a civilian agency to co-operate closely with the work of the military establishment. In World War II, the War Production Board speeded production, increased industrial facilities, conserved and allocated materials, and saw that the balance between military demands and essential civilian needs was maintained.

Recognizing this need in a troubled world, Congress, by the National Security Act of 1947, established two organizations, the National Security Resources Board and the Munitions Board of the Military Establishment. The NSRB was charged with advising the president on co-ordination of military, industrial and civilian mobilization in event of war. The Munitions Board co-ordinates activities within the military establishment with regard to industrial matters, and plans for the military aspects of industrial mobilization.

As has been reported frequently, the Munitions Board is doing an excellent job in developing basic plans and establishing industrial committees to assist in providing adequate and intelligent procedures for using industry to best advantage. For example, the foundry industry has an overall advisory committee with members from each of the three ferrous and two nonferrous branches and from the producers of foundry equipment and supplies. To assist this committee, ten sub-committees have been appointed and are being organized.

While this work has been prosecuted actively by the Munitions Board, similar progress in consummating an acceptable program and establishing active co-operation of industry languishes in NSRB. Various divisions have prepared plans, but approval is lacking. For example, an organizational setup for the ferrous industry has been prepared, which incidentally provides for a separate unit for ferrous foundries with appropriate advisory committees, but top side has failed to give approval. An exceptional study of the foundry equipment and foundry supply industries has been completed in the tools division, but necessary action on the report's recommendations has not followed.

This inactivity stems from the fact the NSRB has had no chairman for some time. Because both the president and Congress have played politics, the board is not functioning properly. And because the Munitions Board is making progress, planning, which should be done by the civilian agency, is gravitating to the military.

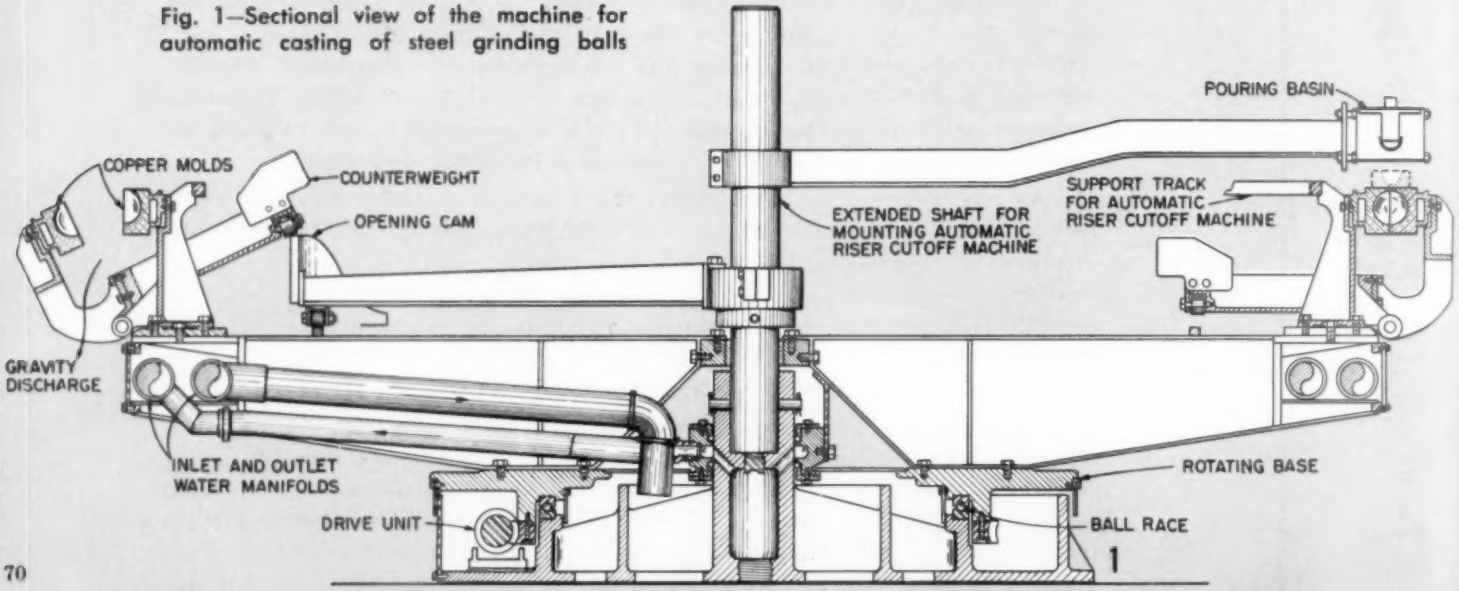
An emergency would find the NSRB not prepared, or the military forced to handle all production and procurement problems. Neither would be satisfactory. Therefore, to protect the nation's security, a chairman of the NSRB should be named and confirmed at once.

Frank G. Steinbach
Editor

Steel grinding balls, used in the mining and cement industries, are produced automatically at a rapid rate by the machine described here. The water-cooled molds used are pure copper

Casting Grinding Balls

Fig. 1—Sectional view of the machine for automatic casting of steel grinding balls



By PEARSON M. PAYNE
P. M. Payne & Co., Denver
and FRANK G. STEINEBACH
Editor
THE FOUNDRY

lls Continuously

A CONTINUOUS, semiautomatic, permanent mold type casting machine is being used to produce cast steel grinding balls by the Rotary Steel Casting Co., Denver, a subsidiary of the National Malleable & Steel Castings Co., Cleveland. The product of the company is used in the mining and cement industries.

This interesting casting machine, which is illustrated from several angles in Figs. 2, 3 and 4, and is shown in sectional view in Fig. 1, consists of 36 water-cooled, copper molds supported on a circular frame or turntable which, in turn, is mounted on a central shaft and bearing. As the turntable moves in a clockwise direction, the molds are opened and closed automatically by a cam, which is shown in Fig. 1, at predetermined points in the cycle. The outer half of each mold is attached to a counterweighted movable bracket which is activated by a stationary cam, also shown in Fig. 1. When the mold is in the closed position, the counterweight rides free, thus holding the movable mold face firmly in position against the stationary face.

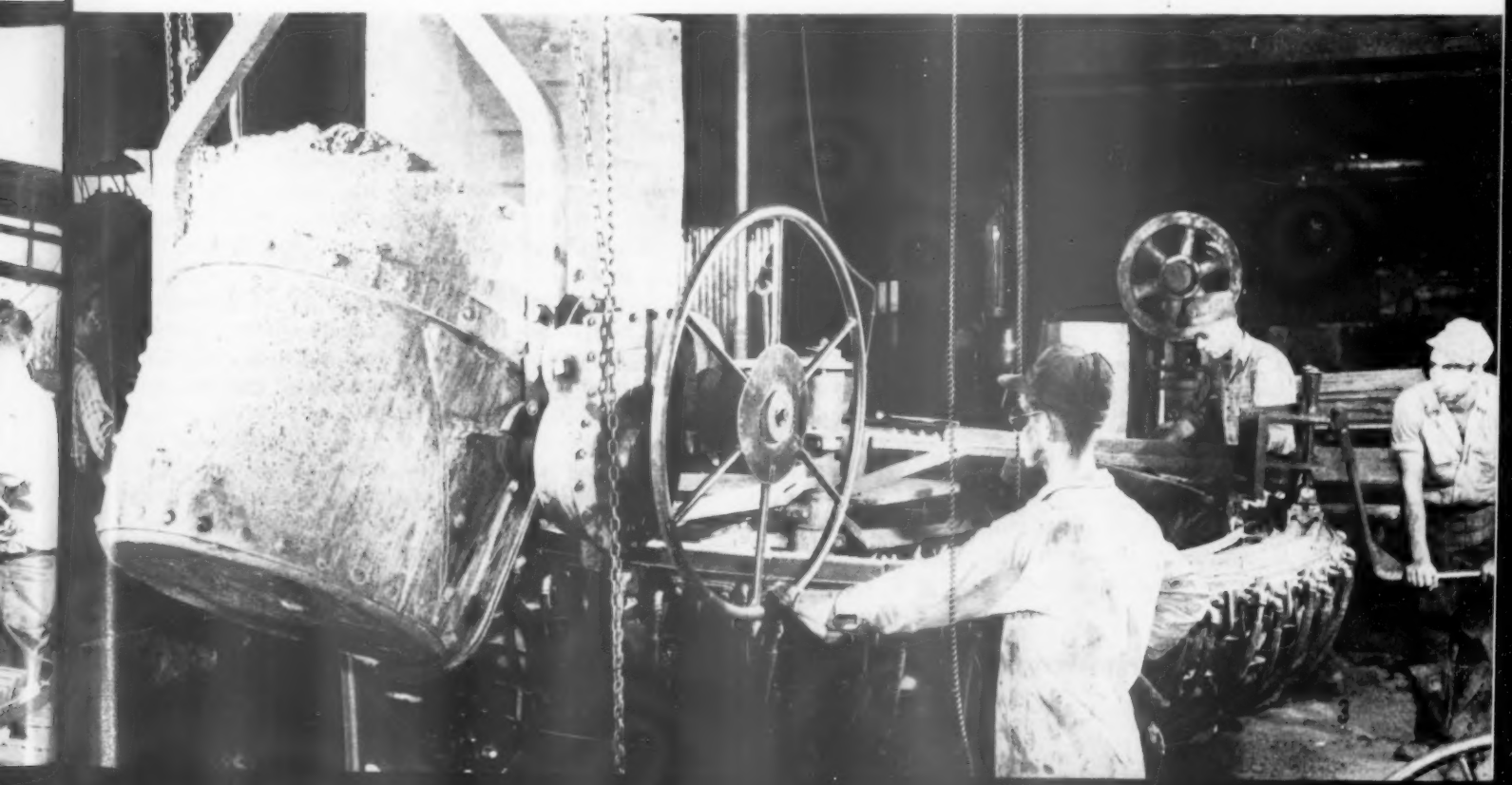
The machine is driven through a variable-speed motor which permits accurate control of table rotation to meet the desired pouring and production factors. Method of handling the water to and from the copper mold, and the method of supporting the pouring basin on an arm attached to the center shaft are illustrated in Fig. 1.

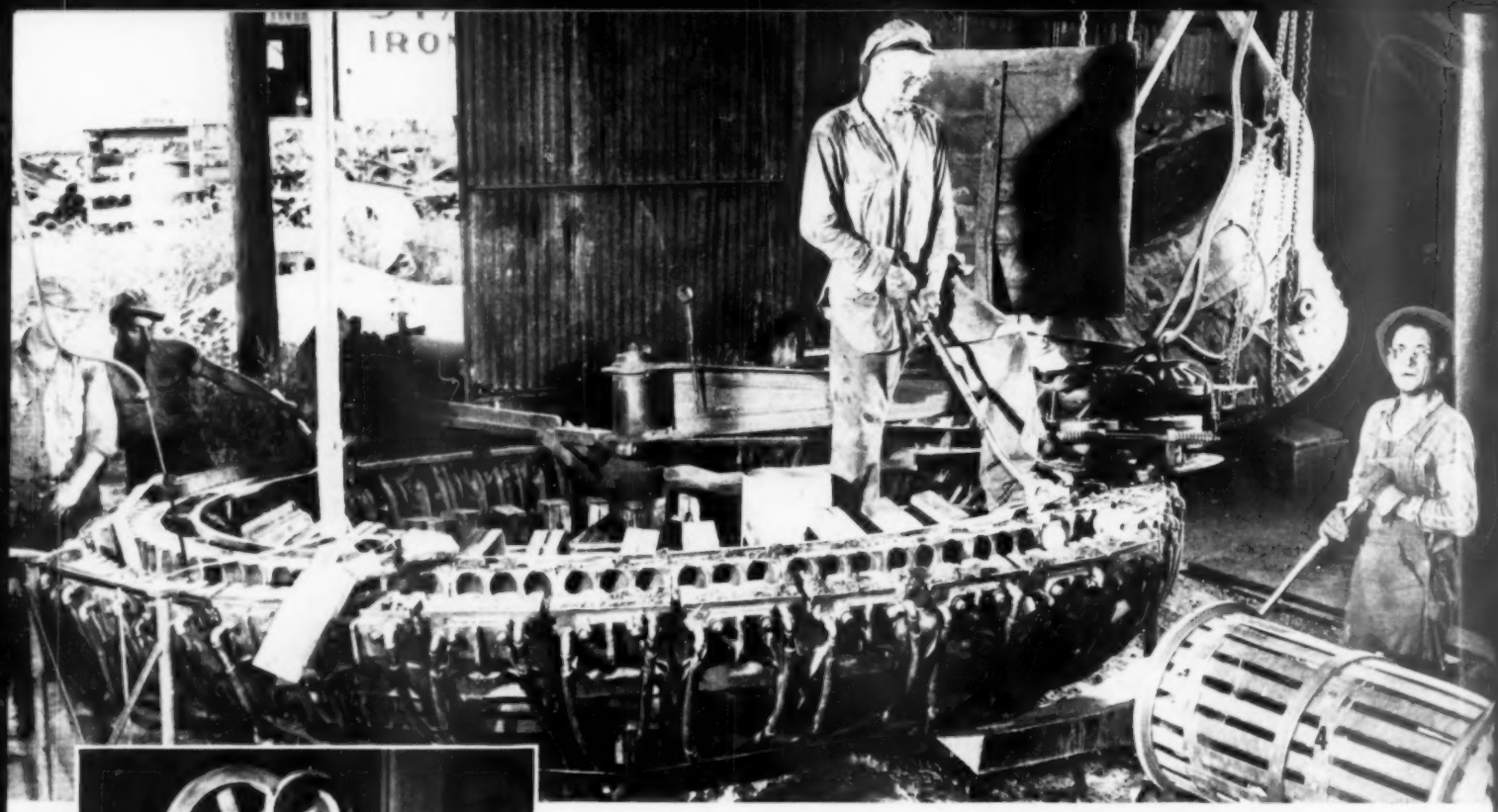
Each mold on the machine is in contact with the metal for a relatively short period of time. In making the 3-in. ball with three balls in each mold, the casting cycle for each mold is three minutes, and the metal is in contact with the mold for about half of that period. Due to this short cycle, warm water is circulated in the molds to maintain a constant mold temperature.

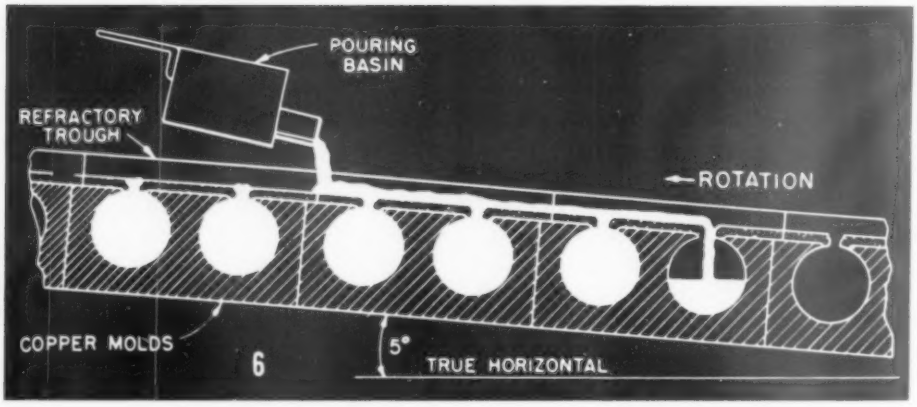
An interesting feature of the ball casting machine is the method of pouring. As may be noted in Figs. 2, 3, 4 and 6, the machine is erected at an angle of approximately 5 degrees to the horizontal. As the molds are closed automatically, green sand runner cores, shown at the lower right in Fig. 2, are placed in position on top of the mold, with gates from the core leading to each of the three ball castings in the mold, as may be seen in the illustration. The conical shaped projections or gates have a ring of sand which conforms to the ball impression of the mold. These sand projections are slightly oversize in diameter so that they are compressed slightly when pressed into the gates of the mold.

Fig. 2 also shows the cores in place forming a con-

Fig. 2—Green sand runner cores, shown at lower right, are located on top of each mold with gates leading to each of three ball castings in the mold
Fig. 3—Cores are squeezed in place firmly by the fixture shown in operation at the right







tinuous runner base from the pouring basin to a point about a quarter of the way around the turntable. These green sand cores, which are produced on a special machine to be described later, are squeezed in place firmly by the fixture shown in operation at the right of Fig. 3. This equipment, mounted on an arm pivoted on the center spindle of the casting machine, is operated by a hand lever. The squeezer moves along with the turntable when being operated, and not only squeezes the core firmly in position, but has an aluminum die 13 in. long which smooths out the face of the runner core.

This die fits the contour of the runner cores as they are set on the casting machine and overlaps the previously squeezed core by 1 in. The die also has shrouds on each side to fit the tapered sides of the core to prevent cracking when the core is squeezed. When the machine is in operation, the core squeezer is positioned above the core, the core is squeezed by the operator applying pressure to the lever, the die is raised by raising the lever and is moved into position above the next core where the cycle is repeated.

Operation of the casting machine is quite simple, due to automatic compensating features. Before pouring begins, cores are set and squeezed and the machine is rotated until the continuous runner core extends from the pouring box to a position about one-third of the way around the turntable circle. With the machine stationary, the ladle attendant pours metal into the pouring basin and permits it to run down the inclined trough to the first gate where it fills the first basin ball impression as shown in Figs. 2 and 6. When this mold impression is full, the metal

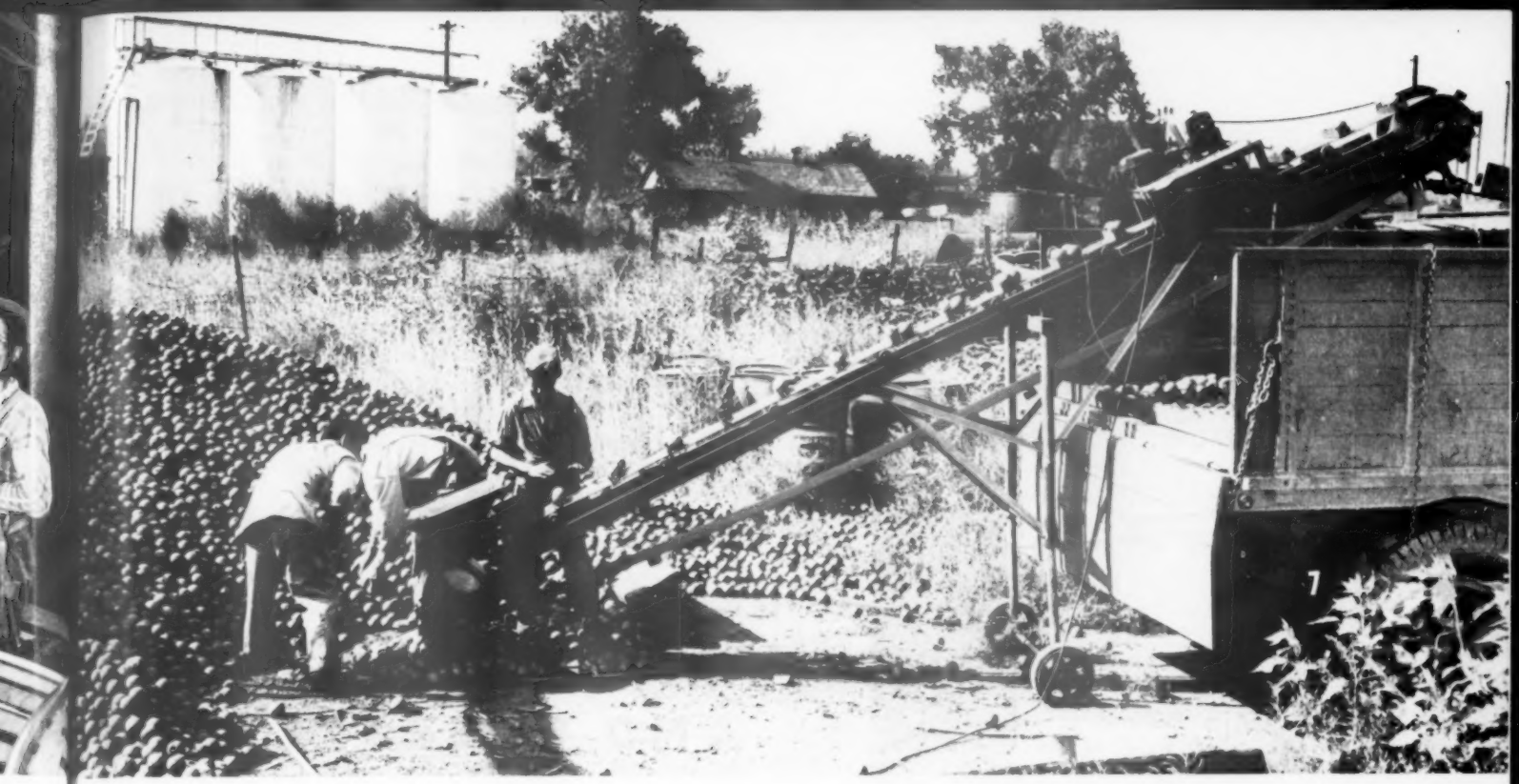


Fig. 4—Rotary cutting disks, mounted on an arm from the central shaft just beyond the pouring basin, cut through the base of the core and remove small risers from the balls while the metal still is ductile

Fig. 5—Special mechanical press produces two cores per stroke at rate of 400 to 600 cores per hour

Fig. 6—Flow diagram showing inclined flow of metal and consecutive filling of the copper molds

Fig. 7—The finished product. Type of machine employed can cast from 3 to 5 tons of balls per hour

continues down the runner core to the second ball impression gate and fills that impression. Pouring and filling molds continues in this way until the metal has travelled approximately 40 inches from the pouring station. The operator then starts the machine which rotates the runner trough and molds in a direction opposite to that of the flowing metal.

Speed of the casting machine is regulated so that the metal continues to flow approximately 40 inches before it enters the new mold cavities constantly moving into pouring position. This method is designed so that after each ball impression is filled, it will travel 40 inches underneath the flowing metal. This running head of molten metal keeps the riser fluid until the metal in the ball impression has solidified, thus preventing shrinkage. Rate of pour is not critical and there is little chance of waste since any variation of speed simply shortens or lengthens the stream of metal in the trough. Rate of pouring also provides control of the temperature at which the metal enters the mold cavity. If the metal is too hot, it can be poured faster so that it will flow 50 or 60-in. down the trough before it enters the molds. A slower pouring rate will compensate for cooler metal.

As may be noted in Figs. 2 and 4, rotary cutting disks are mounted on an arm from the central shaft just beyond the pouring basin. These disks cut through the base of the sand core and remove the small risers from the balls while the metal is still ductile. As the mold moves along, the counterweighted arm at the discharge position opens the mold and permits the ball to discharge into a conveyor below.

After the empty mold passes the discharge station, the mold face is cleaned by a jet of compressed air. The mold then closes automatically, the core press assistant places fresh cores on the top to build the new refractory trough and the cycle continues until the metal in the ladle is exhausted or, if continuous melting and pouring facilities are used, until the end of the production run.

Because the cores must have sufficient strength to permit handling in the green state, a special mechanical core press has been developed which permits a production of 400 cores per hour with one press operator and one man removing the cores to the core conveyor, and 600 cores per hour if two men remove cores and stack them.

The press is equipped with a double steel corebox for making two cores per stroke. The press has steel core plates, gate forming pins and replaceable steel upper dies. An auto- (*Please turn to page* 217)

THE Cupola —ITS RAW MATERIALS AND OPERATION

The important influence of air volume and coke ratio on operation of the cupola is discussed by the author. This is the second and concluding article covering the fundamental laws which establish the basis for successful cupola operation

By B. P. MULCAHY
President
Fuel Research Laboratory Inc.
Indianapolis

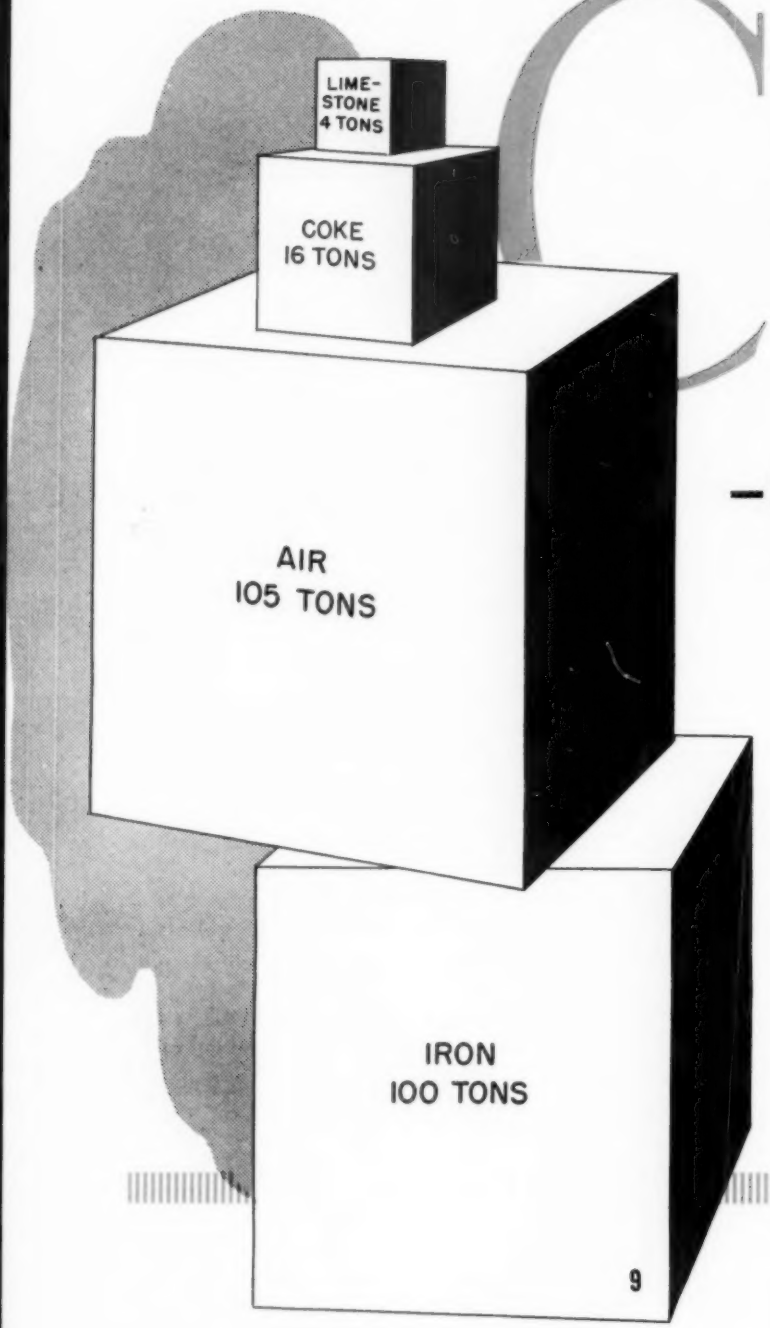
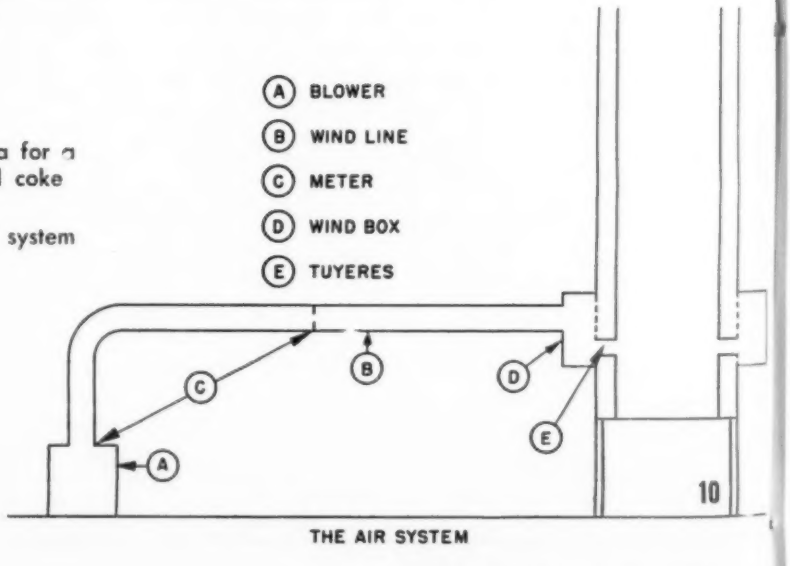


Fig. 9—Raw materials required by the cupola for a 100-ton heat. Coke required includes bed coke

Fig. 10—Essential parts of the cupola air system



THE AIR SYSTEM

Fig. 11—Heat released per pound of coke (90% C)

Fig. 12—Illustrating the cupola melting rate under varying air volumes for different coke ratios

PROBABLY the most exacting demand made of a coke is that, under any and all conditions, the carbon in the final iron must conform to that desired. This is impossible.

It has already been mentioned (THE FOUNDRY, February) that cokes vary in their characteristics principally because of the coals available to the producer. Of even greater significance and impact on the question of carbon absorption is the manner in which the coke is burned. Carbon is the most mobile element in the entire process—it can be absorbed or released depending on the particular conditions existing at any one time. This must be emphasized, for it is the underlying principle of successful cupola operation.

The accompanying charts illustrate how combustion conditions can be shifted simply by varying the quantity of air.

As the chaotic conditions of the war years recede we must not adopt the attitude that coke quality will automatically and permanently improve. Unquestionably coke will become better as coal supplies themselves improve, but the best protection can be gained by making the operation less dependent on premium-quality coke and taking full advantage of the benefits to be derived from the other factors involved.

Air—Air is the one element over which the operator, if he would, could have complete control. By proper design of the conducting system, selection of the proper blower, and finally the admission and control of the proper quantities, he can establish a fully reliable process for its introduction. Such a system would be completely independent of the human vagaries which are so much a part of all of the other factors of cupola operation.

Air influences production rate, costs, losses, coke ratios, metal temperature, analyses and physical properties. Because of air's influence we should be thoroughly conversant with its habits so that we may direct and control its effect.

In general, this discussion will be confined to cold blast operation, with a brief mention only of the special processes of hot blast and dehumidification. We are concerned with the fundamentals and these are not materially altered by the use of special equipment.

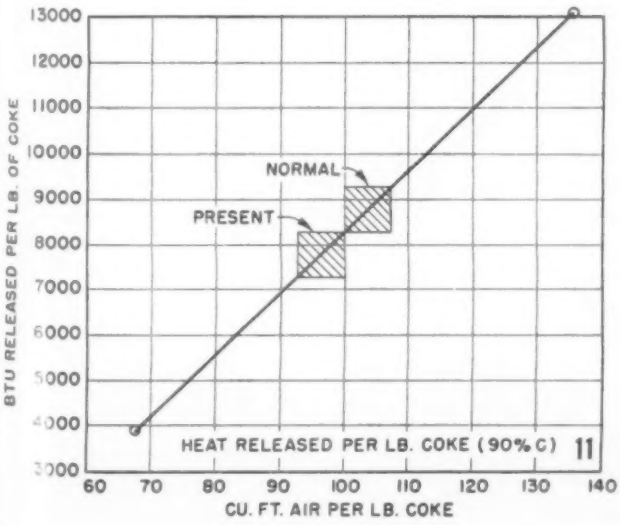
The quantity of air used in the cupola for each day's heat is far greater than is generally realized. Depending upon the particular conditions of combustion existing, the amount of air by weight will be equal to or greater than the amount of metal charged. This is shown graphically in Fig. 9, which illustrates that a 100-ton heat requires 105 tons of air—more than any of the other materials charged. This fact alone should convince us that the accuracy of its measurement should at least be equal to that of the metal charged. A second important point on this figure is the proportion between the quantity of air charged and the amount of coke used. Each ton of coke requires approximately 8 tons of air. In the instance given bed coke has been figured in the total quantity.

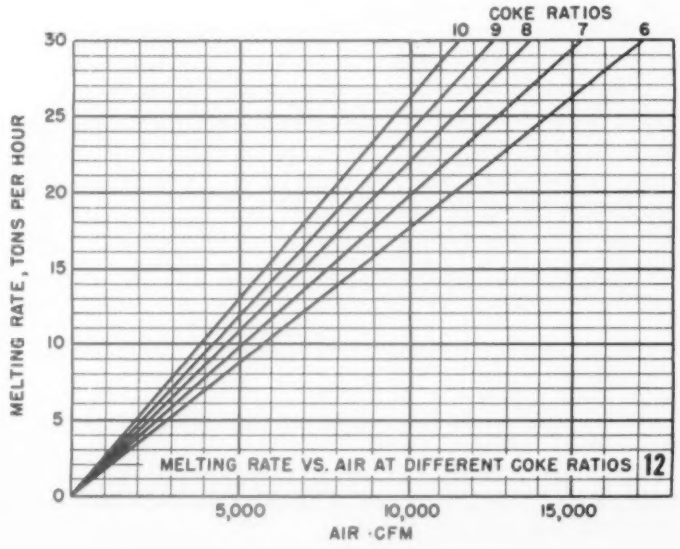
The objective of the air system is to introduce the correct amount of air at all times into the cupola. Since this is a mechanical system we must, therefore, consider all of the elements of the system and their respective influence on the objective.

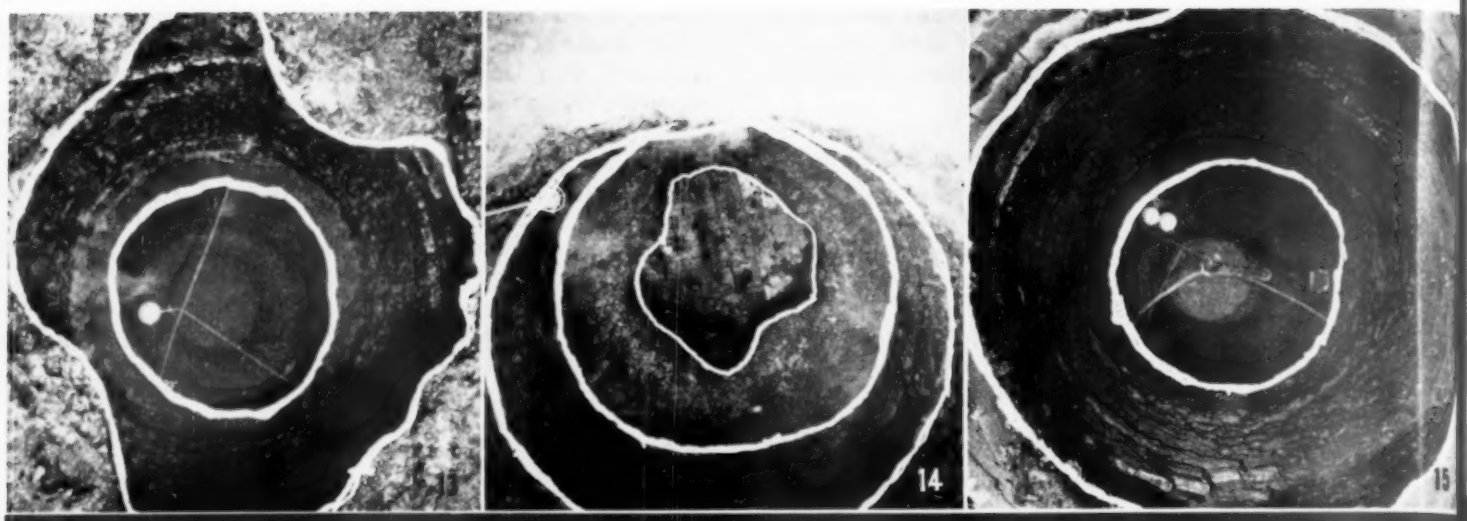
Fig. 10 illustrates the essential parts of the air system. This has been broken down into: *A*—blower; *B*—wind line; *C*—meter; *D*—wind box; *E*—tuyeres.

The blower, of course, is the source of the air required. Types generally used are the rotary or positive pressure, the fan and turbine. The type used is actually immaterial so long as it will deliver the quantity of air required, and mechanically have a reasonable life expectancy. The important point is for the blower to have sufficient capacity for variable demands for the cupola to which it is connected, and further that its volume can be changed properly within the range of melting rates desired.

The wind line should be of sufficient size to conduct the air generated at the blower to the wind box with a minimum of pressure loss and should be tight at all times. If an orifice type meter is







employed, the wind line should have sufficient length of straight run to permit proper installation of the orifice.

A reliable meter is a "must" for all cupola operations. There are two general types, the orifice or pitot tube operating on the principle of pressure differential, and the ammeter measuring power input. In either case the function of the meter is to give a reliable index of the rate of flow of air at some standard condition. Generally this is 60° F, 30-in. of mercury.

A good meter can be improperly installed, and extreme care should be exercised that the meter registers the correct amount of air. Many operators are content with the meter showing relative changes. This is not sufficient because we are concerned with maximum economy in which fundamental laws govern, and our instruments, therefore, should measure the correct quantity of all materials used.

A pressure gage is a valuable and simple instrument which should be attached to each cupola. However, it is not a substitute for a meter. The pressure gage will measure a state of pressure condition in the entire system. With other conditions remaining the same, a change in air rate will be reflected by a change in the pressure in a regular proportion. However, with the air rate remaining the same (when automatically controlled) and an increase in resistance to flow builds up in the cupola due to "bridging" or stock size or some other cause, the pressure will increase. This illustrates the danger of using the pressure gage as an index of rate of flow under all conditions. The pressure existing in any cupola is dependent on the amount of air flowing, the tuyere size and the back pressure condition within the stack.

The intent of the wind box is to provide a chamber from which the air can be uniformly distributed to each tuyere. Actually such a state seldom exists, because the wind box does not have sufficient capacity and is not properly designed to accomplish this. With a single-entry tangent wind line a circular flow of air is set up, and potentially the air flowing through each tuyere can be different.

Because the wind box does not function as it should, the objective of equal quantities of air through each tuyere is seldom accomplished, and corrections toward this end must be made.

No attempt will be made to discuss tuyeres so as to include all of the ideas which have been developed over the years. The function of the tuyeres is simply to permit equal quantities of air to pass through each tuyere continuously during the heat. The simplest design which will accomplish this purpose is the best.

Continuous vs. intermittent tuyeres has always been a subject of considerable dispute. Actually, most of the dispute arises from the fact that, in many instances, the word "continuous" is a misnomer, and further, when a cupola is "bridging" badly, any difference existing initially between the two types of tuyeres has been completely destroyed.

The writer prefers the simple conventional box type tuyere because they are easily constructed and permit easy modification of area for controlling the flow. For cupolas up to 60-in. in diameter, a good total area (measured wind box side) has been found to be approximately 25 per cent. For cupolas larger in diameter than 60-in. the total area should be from 15 to 25 per cent.

With the above areas, sufficient surplus area is available to reduce one or more tuyeres to effect proper aid distribution. This is easily done by mudding in bricks to correct the flow of air as dictated by repeated cupola burn-outs.

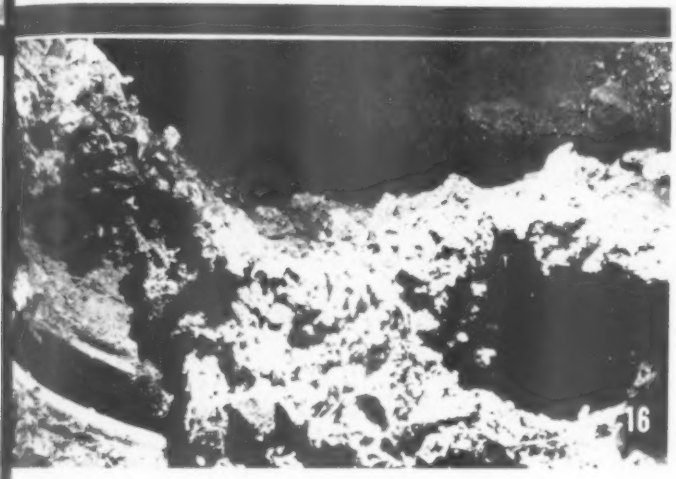
Tuyeres should be kept in good mechanical condition; that is, warped or broken pieces should be immediately removed in order to support the lining and to maintain proper area.

Function of Air—It is understood, of course, that the principal function of air is to furnish oxygen for the combustion of coke to supply the heat required for melting the iron. An important secondary condition is the potential combustion of the carbon, silicon and manganese in the metal. This bears heavily upon the resultant chemistry and physical properties of

Figs. 13-14—Showing heavy bridging at tuyeres of a cold blast cupola. First view is upward from cupola bottom, second is downward from charging door

Fig. 15—Upward view from bottom of hot blast cupola discloses absence of bridging at tuyeres

Fig. 16—Close-up view of bridging in cupola. Lining erosion extends to depth of 15 inches



the metal when it is poured into the mold.

The reactions of combustion are so simply expressed that we are misled in the full implication of their meaning.

The most important chemical reactions occurring within the cupola are those involving the combustion of the coke with air because they control the whole melting process. As generally written these reactions are:

1.	$C + O_2 = CO_2 +$	14,550 Btu
2.	$2C + O_2 = 2CO +$	4350 Btu
3.	$2CO + O_2 = 2CO_2 +$	10,200 Btu
4.	$CO_2 + C = 2CO -$	5850 Btu
5.	$2CO = CO_2 + C +$	5850 Btu

In each instance the Btu shown is the amount of heat released per pound of carbon. The second equation is the final result of two reactions.

First stage	$C + O_2 = CO_2$
Second stage	$CO_2 + C = 2CO$
Final	$2C + O_2 = 2CO$

The important point concerning these reactions is that they represent individual equilibrium conditions, while in the cupola we have dynamic conditions under constant change, and some of these reactions oppose each other. This means, of course, that each of these reactions proceeds in accordance with the conditions favorable to it and in magnitudes consonant with overall influences, so that the end products in the cupola represent a composite of the several reactions.

The simplicity of these reactions as written with no further explanations is very misleading, for they do not permit proper interpretation of the possible magnitude under the conditions of actual operation. The point is that, these reactions all proceed at entirely different rates. For instance, reaction No. 1 at 1800°F proceeds almost instantaneously, while reaction No. 4 at this same temperature is considerably slower. Reaction No. 5 is the reverse of reaction No. 4, and at 1562°F proceeds at a rate 166 times slower than reaction No. 4. We have already mentioned that reaction No. 2 is a resultant of two reactions rather than a direct reaction as written. If this is so, then reaction No. 3 cannot take place except in some minor capacity. In actual operation when CO is formed, as under reaction No. 4, in the upper part of the stack above the bed under lower temperature conditions, no oxygen is present. So for the most part the CO remains as such in the final effluent gases.

Time is extremely important in the extent that any of these reactions can occur, and in fact is frequently the controlling factor in the resultant composite effect. Its effect also is shifted by a change in the amounts of the reactants.

An accompanying graph (Fig. 11) shows the amount of heat released per pound of coke under different combustion conditions and the change from normal conditions to present conditions.

Unfortunately, most of the published tables showing the quantity of air required for combustion have been calculated on the basis of the maximum theoretical heat released. These tables, therefore, should not be used to determine the quantity of air actually required for a given cupola operation.

The graph, for example, shows that if we used the maximum this would be 136 cu ft of air per pound of coke, while actually present day conditions require approximately 100 cu ft per pound of coke. No cupola can be run under the conditions of maximum heat released, for to do so would create excess oxidation, making it impossible to produce commercial iron.

Amount of Air Used—While Fig. 11 shows the quantity of air required per pound of coke for different combustion conditions and the present day normal range, we do not measure air in this manner. This is done generally in cubic feet or pounds per minute, and this relationship under different conditions is shown in Fig. 12.

Attention is called to the fact that most of the published charts on the quantity of air required for different conditions of operation have not been reduced to a practical basis. This renders them difficult to interpret and the second graph therefore has been calculated to a more readily usable form.

We have shown that the higher amount of air used per pound of coke the greater is the amount of heat released per pound. We have also pointed out, however, that it is impractical to carry this condition to completion. It is worthy of note also that as the coke per charge and per cubic foot of air is decreased, the melting rate of the cupola increases, but eventually with the continuing decrease in coke the iron would become too cold to pour. (*Please turn to page* 198)

Specific instances in which use of motion study has saved money for foundries are detailed by the author. This paper was presented before the Metals Casting Conference at Purdue University, Nov. 3, 1949

Foundry Cost Reduction T

Operation The doing of something at one place.

Quantity Determination A special form of operation involving the person determining the quantity of an item present.

Inspection A special form of operation involving the person comparing an attribute of a product with a standard, or verifying the quantity present.

Movement A change in location, moving from one place to another.

Delay Idleness. Waiting or moving, provided the movement was not part of the job and the time could have been spent waiting.

By M. E. MUNDEL
Professor of Industrial Engineering
Purdue University
Lafayette, Ind.

on Through Motion Study

THE first question the cost-conscious foundry manager might well ask is, "Can foundry costs be reduced through the application of motion study?" The answer is an unqualified yes. This need not be accepted on faith but may be proved by reference to the results obtained by foundries which have applied modern motion-study analysis techniques to their cost-reduction problems.

One large steel foundry obtained these results from the first group of jobs it examined with the aid of modern motion and time study techniques:

1. The work of changing blow plates on core blowers was made easier and the reduced time for change enabled the foundry to save $3400 a year.

2. The crew on a mechanical blasting operation was reduced from three men to two while the cycle time was reduced by 2 per cent without increasing the effort required by the crew. This meant a 35 per cent cost reduction or approximately $3000 a year saved on a single-shift basis.

3. In the molding operation for making lugs and chills the company had just saved $10,800 by the installation of new equipment. It thought it had done an excellent job. An additional motion study analysis indicated that $6000 more a year could be saved through better utilization of direct labor.

4. In molding a 200-pound core (a job which was in continuous operation) a motion-study analysis of the equipment and motions used indicated that 40 per cent more productivity could be obtained, saving the company approximately $5000 a year.

5. A change in design of the test bar casting as well as a change in its routing and handling enabled the company to save $1150 a month.

6. A study of the handling of requisitions was instrumental in developing a procedure that not only did the job more expeditiously, but also produced a considerable saving of time of the important executive personnel. The savings on this cannot be accurately expressed in dollars and cents.

7. In casting knock-out it was found possible to save 23 per cent of the direct labor totaling about $12,000 a year.

Space limitations prevent giving the details of more than two of these jobs but these two are worth examining in order to understand the procedure used in producing these savings.

Case 1—Changing Blow Plates—It is particularly important to note that the graphic illustrations presented as part of the analyses made of this operation on core blowers were made, not by the Industrial Engineering Department of the plant, but through cooperative action of the general foreman of the coreroom, the shop superintendent, the general foreman of the pattern shop, and the master mechanic, with some assistance from the Industrial Engineering Department. This assistance was limited primarily to supplying these men with the time values shown on the charts, which information they specifically asked the Industrial Engineering Department to supply. It is important to note that they knew what to do with these values. It would not be an over-statement to say that the ability of all these individuals to understand and work with suitable motion and time-study techniques was a fundamental prerequisite in the development of the improved method.

In this plant's coreroom many different cores had to be blown on each machine. A preliminary economic analysis made by these men (using a simple but formal motion-study technique—the possibility guide), indicated it was probably desirable to confine all changes to hand and body motions or to the tools, equipment and work place. The operation of the core blower naturally divides into two phases, "set-up" and "do," with each corebox. While a considerable number of changes were made in the method of "do," this discussion is confined to the development of changes in the "set-up." The "set-up" consists of switching coreboxes, which is done by the materials handler, and changing blow plates, which is done by the blower operator. Each corebox usually requires a different blow plate which covers different holes in the master

Symbols and their definitions (left) are used in a process chart-man analysis. This analysis is a graphic representation of the sequence of steps in the work performed by a man who, in the course of his operations, moves from place to place

blow plate attached to the body of the machine.

A process chart-man analysis of the original method made by the examining group is shown in Fig. 1. A time column was found to be useful on this chart although this is not usually included.

A process chart-man analysis is a graphic representation of the sequence of steps in the work performed by a man who, in the course of this operation, moves from place to place. On such a job, in order to record the method in use in a form suitable for study and criticism, the activities of the man are recorded in terms of the steps and symbols shown on page 78.

After this initial analysis is made the next step is the application of check lists of desirable and undesirable features applicable to this type of work recorded in this form. Such check lists are contained in basic motion and time study textbooks.[1] One of the most outstanding features of this approach is that breaking a job down into units of this type permits the application of the check lists to all jobs of this general type; that is, a man moving while working. Hence, instead of each job being a problem all by itself, we may apply principles learned from many jobs with highly preferable work methods resulting.

An application of the check lists aided in replacing this original method with the improved method shown in Fig. 4. In addition, the machine fastenings, which held the blow plates in place, were redesigned to facilitate changes of plates and to make less work. Savings from these changes are given in the following excerpt from the report the men who developed this change made to the works manager of the plant:

"Analysis of the steps required by the proposed method indicates the time required for changing a blow plate will be approximately seven minutes. The present type of plate requires 15 minutes to change. A saving of 8 minutes per plate change is indicated.

"An average of 15 plate changes per day are made. A saving of two blower-hours per day will result from this change. Two blower hours cost $3.50 in direct wages. Since the hours saved can be used for production which is needed, we may include overhead in the saving which increases it to $13.70 per day or $3400 per year.

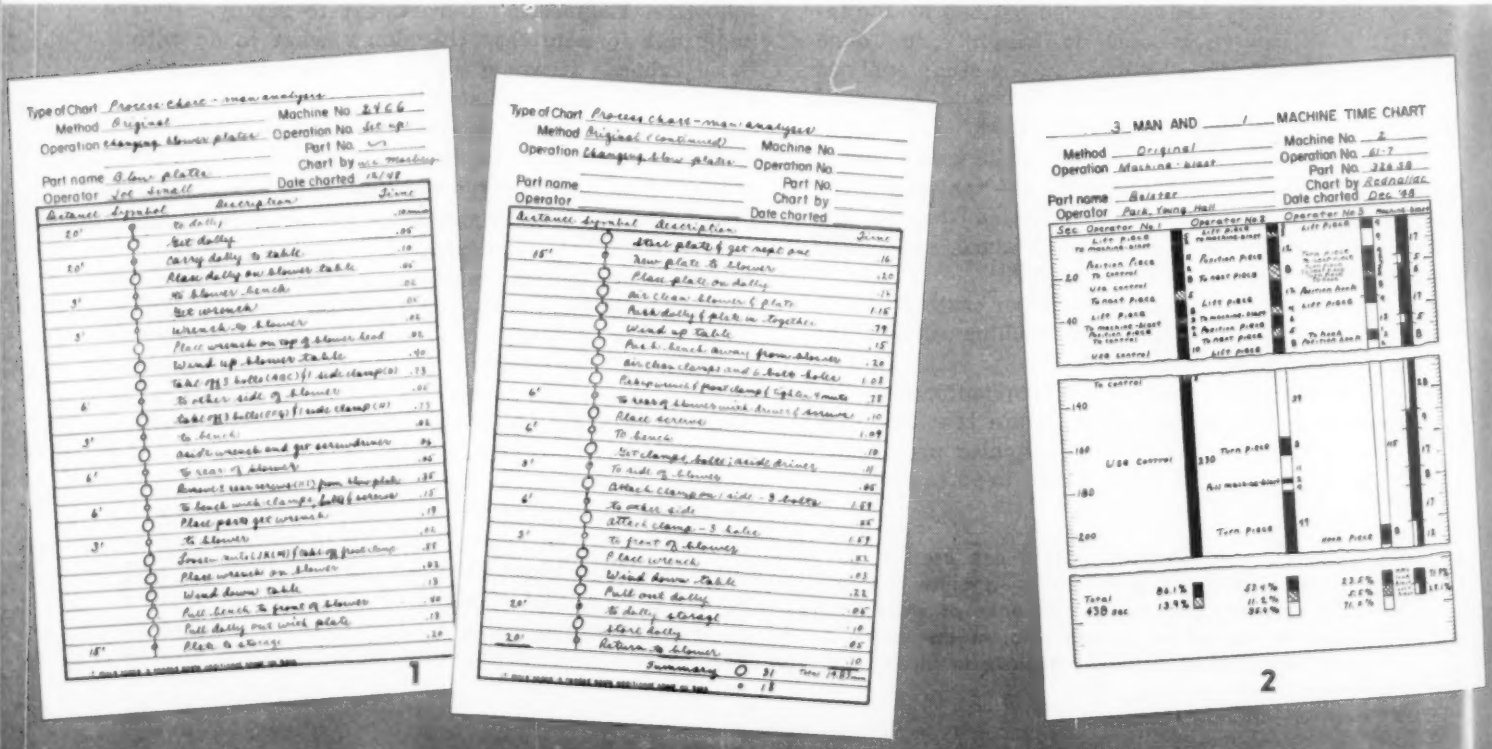
"In additon to the measurable savings in blower time, it appears that a saving will be made as the result of decreasing the incidence of blow plates sagging in the center which has become a problem with the present method of fastening. The reverse tapers and the supports on all sides of the new blow plate should help correct these defects.

"The cost of changing over to the new method will be $280 per blower and $12 for each plate. New plates will cost $8 more than present plates but may repay this in an extended life. An expenditure of $1080 is anticipated to obtain the $3400 increase in production which will return the investment in less than four months in increased production alone."

Case 2—Mechanical Blasting—The second job mentioned in the original list was approached with a different technique. Inasmuch as a crew problem such as this presents a much more complex problem for analysis, a special motion picture, taken at one frame per second rather than the usual speed of 16 frames per second, was used to record the original work cycle. Such a film study is called a "memomotion study."[2] Sufficient light was available from the building monitor to make supplementary lighting unnecessary during the photographing. The crew was aware that it was being filmed. The men were photographed at work and an analysis made of the film to obtain data with which to con- (*Please turn to page* 136)

Fig. 1—Process chart-man analysis for original method of changing blow plates on core blower. The improved method is charted in Fig. 4

Fig. 2—Sections of a memo-motion analysis chart listing original method of machine blasting. Chart indicating proposed method is indicated in Fig. 3

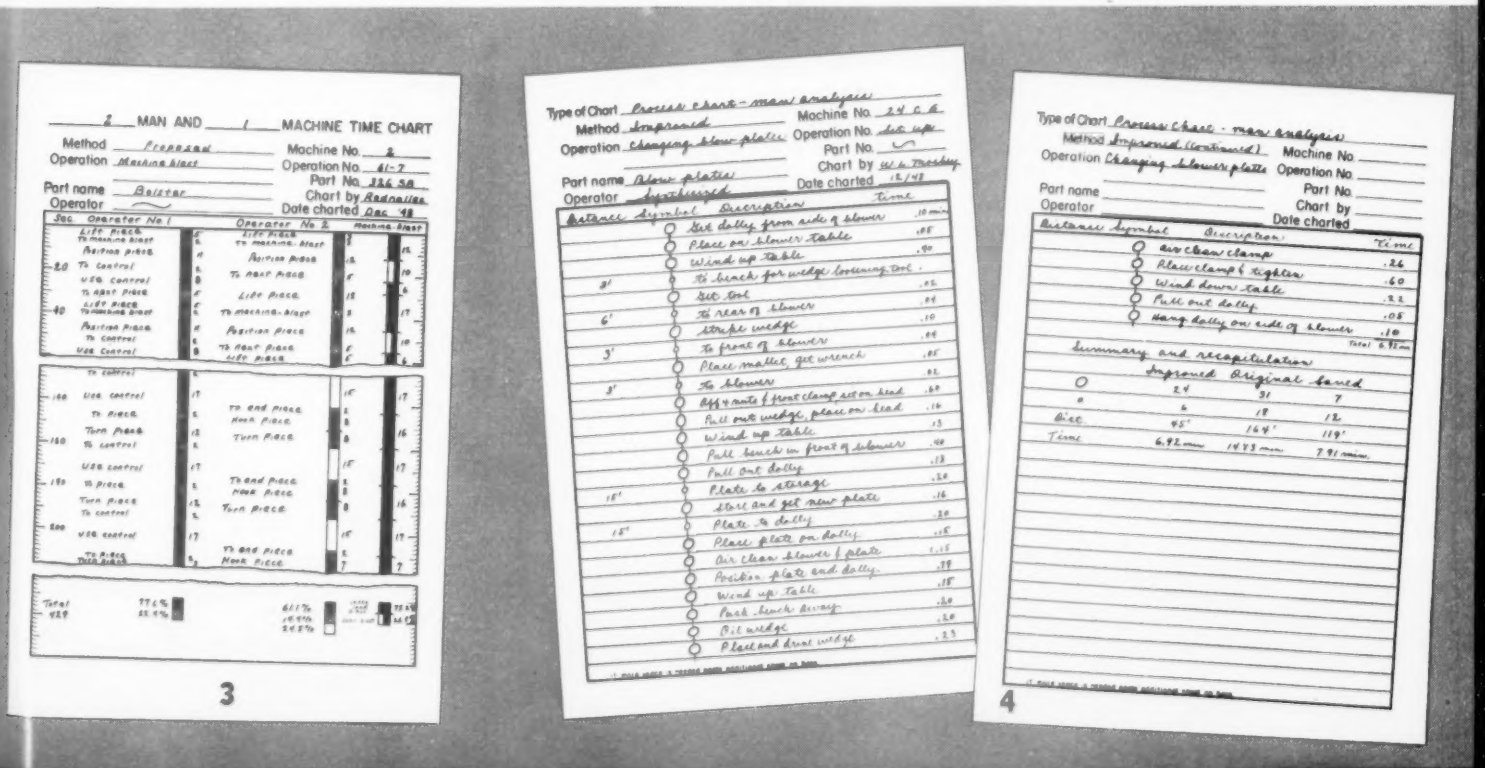

Type of Chart Process chart - man analysis
Method Original
Operation changing blower plates
Part name Blow plates
Operator Joe Small
Machine No 2466
Operation No Set up
Part No —
Chart by W.S. Mackey
Date charted 12/28
Distance | Symbol | Description | Time
20' | To dolly | .10min
Get dolly | .05
20' | Carry dolly to table | .10
Place dolly on blower table | .05
3' | To blower bench | .02
Get wrench | .01
5' | Wrench to blower | .02
Place wrench on top of blower head | .02
Wind up blower table | .90
Take off 3 bolts (ABC) & 1 side clamp (D) | .73
6' | To other side of blower | .06
Take off 3 bolts (EFG) & side clamp (H) | .73
5' | To bench | .02
Put wrench and get screwdriver | .03
6' | To rear of blower | .06
Remove 2 rear screws (IJ) from blow plate | .35
6' | To bench with clamps, bolts & screws | .15
Place pan & get wrench | .19
3' | To blower | .02
Loosen nuts (KLM) & take off front clamp | .59
Place wrench on blower | .03
Wind down table | .13
Pull bench to front of blower | .50
Pull dolly out with plate | .13
15' | Place to storage | .30
Summary 31 Time 7.83 min
18
1
Type of Chart Process chart - man analysis
Method Original (continued)
Operation Changing blow plates
Part name
Operator
Machine No
Operation No
Part No.
Chart by
Date charted
Distance | Symbol | Description | Time
Store plate & get repl one | .16
15' | New plate to blower | .20
Place plate on dolly | .14
Air clean blower & plate | 1.15
Push dolly & plate in together | .79
Wind up table | .15
Push bench away from blower | 1.08
Air clean clamps and 6 bolt holes | .28
6' | Take off screws & front clamp (4 at a time) & put in pan | .78
To rear of blower with driver & screws | .10
Place screws | 1.09
6' | To bench | .10
Get clamps, bolts & side driver | .05
3' | To side of blower | 1.69
Attach clamp (H) side - 3 bolts | .25
6' | To other side | 1.69
Attach clamp - 3 bolts | .81
3' | To front of blower | .03
Place wrench | .22
Wind down table | .05
Pull out dolly | .10
20' | To dolly storage | .05
Store dolly | .10
Return to blower
Summary 31 Time 7.83 min
18
3 MAN AND 1 MACHINE TIME CHART
Method Original
Operation Machine blast
Part name Blaster
Operator Park, Timing, Hall
Machine No. 2
Operation No. 61-7
Part No. 326.58
Chart by Rednalax
Date charted Dec 98
Sec Operator No 1 | Operator No 2 | Operator No 3 | machine blast
Lift piece to machine blast
Position piece to control
Use control
Turn piece
Total 438 sec
2

Steel Foundries Methods Research Program

CONFERENCE NUMBER	READ* CHAPTERS	NEW TOPICS	DISCUSS	PREPARE FOR NEXT CONFERENCE
1	1, 2, 3	Objective of conference series. Meaning of methods research. Possibility guides.	Films of methods research results at other plants.	Possibility guide.
2	4	Process charts—product analysis.	Possibility guides.	Process chart—product analysis.
3	5	Process charts—man (and combined) analysis.	Process charts—product analysis.	Process chart—man analysis.
4	6, 7	Operation analysis. Man and machine analysis.	Process charts—man analysis.	Operation chart. Tentative project selection.
5	8, 9	Crew and film analysis.	Operation charts.	Project subcommittees to work on selected jobs.
6, 7		Micro and memomotion analysis.	Film analysis.	
8, 9		Committee reports and discussions.		
10	10, 11 12, 13, 14	Methods research, time study, wage incentive and job evaluation. Time study-objectives, methods, description, timing and rating.	Policies of Amer. Steel Foundries. Methods description.† Rating and standard.†	Methods description for time study.
11		Complete time study. Time study policy.	Taking time studies and obtaining performance.	Plan for methods research and time study for each division of plant.
12		Evaluation of program to date and planning of subsequent steps for East St. Louis Works.		

* *Systematic Motion and Time Study*, M. E. Mundel, Prentice-Hall, N. Y. C., 1947.

† Committee reports on progress as time permits.


2 MAN AND 1 MACHINE TIME CHART
Method Proposed
Operation Machine blast
Part name Bolster
Operator
Machine No. 2
Operation No. 61-7
Part No. 126 58
Chart by Rednalius
Date charted Dec 48
Operater No 1
Operater No 2
Machine Blast
Type of Chart Process chart - man analysis
Method Improved
Operation Changing blow plate
Machine No. 24 C B
Operation No. set up
Part No.
Chart by W. A. Mosby
Date charted 12/48
Part name Blow plate
Operator Improved
Distance Symbol Description Time
Set dolly from side of blower .10 min
Place on blower table .05
Wind up table .90
To bench for wedge loosening tool .
Set tool .05
To rear of blower .04
Strike wedge .10
To front of blower .04
Place mallet, get wrench .05
To blower .02
Off + nuts & front clamp set on head .60
Pull out wedge, place on head .14
Wind up table .13
Pull bench in front of blower .40
Pull out dolly .13
Plate to storage .20
Store and get new plate .16
Plate to dolly .20
Place plate on dolly .15
Air clean blower & plate .15
Position plate and dolly .39
Wind up table .15
Park bench away .20
Pit wedge .20
Plate and drive wedge .23
Type of Chart Process Chart - man analysis
Method Improved (continued)
Operation Changing blower plate
Machine No.
Operation No.
Part No.
Chart by
Date charted
Part name
Operator
Distance Symbol Description Time
Air clean clamp .26
Place clamp & tighten .60
Wind down table .22
Pull out dolly .05
Hang dolly on side of blower .10
Total 6.92 min
Summary and recapitulation
Improved Original Saved
24 31 7
4 19 12
Dist 45' 164' 119'
Time 6.92 min 14.83 min 7.91 min
3
4

By HAROLD M. GADE

Influence of Blowhole Diameter, Vent Area and Air Pressure in CORE BLOWING

THIS PAPER is intended to initiate a systematic study of core blowing in order to determine underlying characteristics with the objective of eventually reducing core blowing box design to an orderly science.

Cores produced in the investigation reported here were bars 1 x 1 x 8 in. They were blown in the horizontal position on a Redford cartridge type core blower. The sand was admitted through a single orifice located over the center of the corebox. Sand mixture and sieve analysis will be found in Appendix III. The sand was mulled 10 minutes in a Simpson laboratory type muller.

Two coreboxes were used. One was a conventional metal corebox vented by commercial vent screens located in the two 1 x 1-in. sides at the ends of the box. The total vent area was 0.498 sq in. This box will hereafter be referred to as the regular corebox.

The second corebox was almost entirely of wire screen. It consisted of an internal box made of 200-mesh wire cloth supported by an external box of 24 mesh nickel screen. The vent area here was equal to almost the entire area of the box with the exception of the top 1 x 8-in. side which was in contact with the blow plate. This box will hereafter be referred to as the screen corebox.

Object of the experiment was to discover the conditions necessary to pack the sand into the corebox as efficiently as possible so as to produce cores which contained no soft areas. The weight of the core was used as the indication of the degree to which this aim had been achieved.

Core Blowing Methods — Preliminary experiments were conducted to determine the procedure necessary to produce as consistent results as possible. Several blowing methods were tried and compared:

1. The sand hopper, which is called a cartridge in the type of blowing machine used was filled by hand to a given line, the core blown, and then immediately weighed.

2. After filling the cartridge to the given line, the blowhole was plugged and air pressure was used to pack the sand into the cartridge. The core was then blown and weighed.

3. The cartridge was filled by hand and the core was blown. Before removing the core from the machine, the air valve was opened a second time to apply an additional impact blow to the packed sand. The core was then weighed.

4. A combination of methods 2 and 3 was tried, packing the sand in the cartridge and also packing the corebox. (It was necessary to open the air valve three times to produce a given core.)

The four methods were found to be approximately equivalent. Method 1 was adopted. The cartridge was completely emptied after each blow and refilled by hand to the given line. Less than half the sand in the cartridge was needed to fill the corebox.

To check the effect of variations in air pressure during the blow, a core was blown with the air valve connecting the machine to the laboratory compressed air line in the wide open position. The coreblower has a small self-contained air storage chamber. This chamber, plus the capacity of the air lines, was sufficient to cause the pressure gage to remain almost constant during the blow. A second core was blown with the line air valve almost completely closed. When the blowing valve was opened the gage pressure dropped to zero in approximately two seconds. The two cores were found to be identical. Thus the self-contained air chamber had sufficient capacity to maintain the air pressure during the fraction of a second required to fill the corebox.

To minimize air leaks between the corebox and the sand cartridge, rubber and paper gaskets were tried. Both proved unsatisfactory. Best results were secured with metal-to-metal contact with the qualification that both metal surfaces must be perfectly flat. As an additional precaution C clamps were used to fasten the corebox to the cartridge. The machine uses a hand operated lever to clamp the compressed air line vertically to the sand cartridge and corebox. A fixed weight was hung from the lever handle to provide constant clamping pressure on the corebox.

Fig. 1—Showing influence of air pressure and blowhole diameter on weight of cores blown in regular corebox

Fig. 2—Core weights obtained with screen corebox having maximum venting

Fig. 3—Curves for three sizes of blowholes from Figs. 1 and 2 are replotted here to show effect of difference in amount of vent area

Fig. 4 — Curves demonstrating that core weight does not increase in direct proportion to air pressure employed on the blower

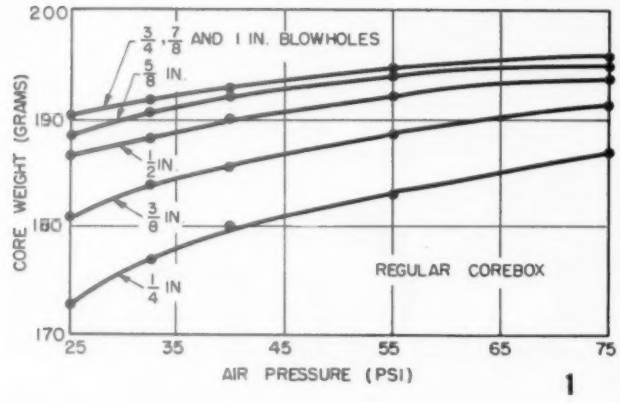
The blowing valve was kept open for a minimum of one second to guard against inadvertently not opening the valve long enough or wide enough in an effort to speed up operations.

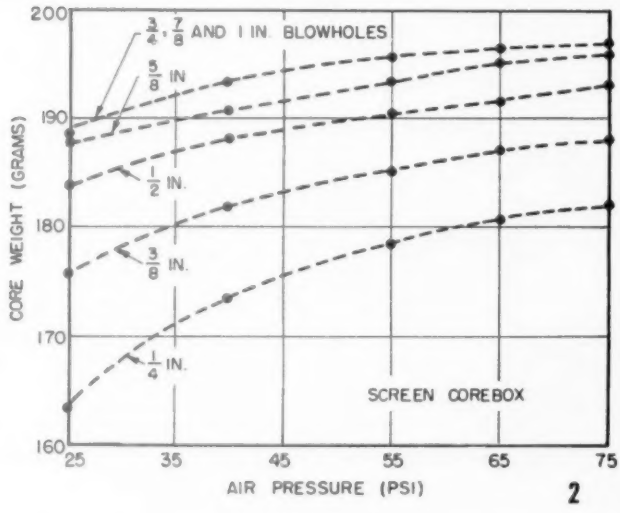
The cores were weighed on a laboratory balance calibrated in hundredths of a gram. The screen corebox was light enough to permit the cores to be weighed without removing them from the box. Cores produced in the regular box were removed and weighed on a flat dryer. Care was exercised to include in the weight any sand grains adhering to the inside of the regular corebox.

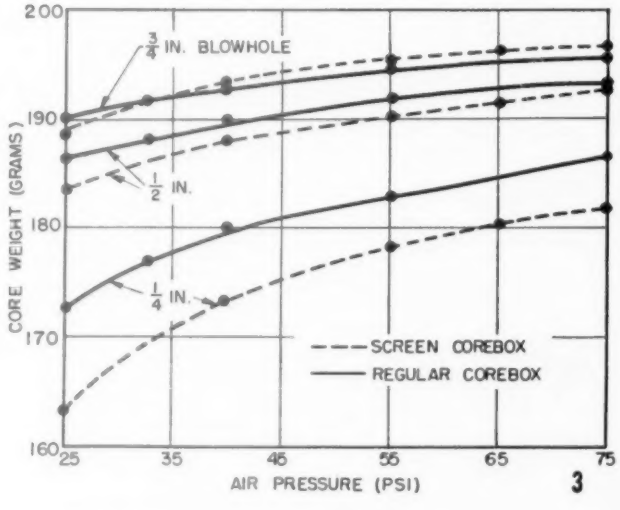
The regular corebox was dusted with parting. The parting was rubbed into the surface and then blown off to prevent any errors due to the entrapment of parting particles within the core. If the box was not dusted with parting a thin coat of core oil would build up at certain points and a slight but noticeable decrease in core weight would occur. Two commercial partings and some household scouring powder were tried as dusting agents. One commercial parting and the scouring powder yielded satisfactory results. The reason for the ineffectiveness of the second commercial parting is not known.

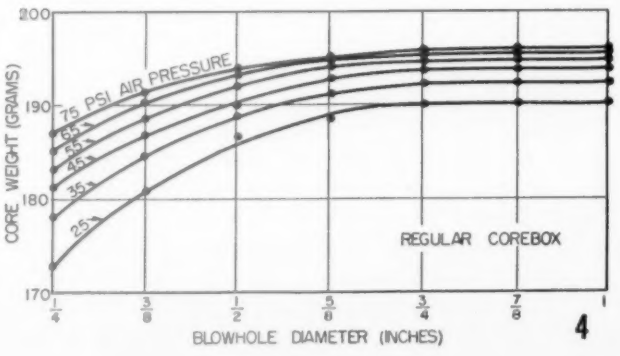
It was found impractical to attempt to construct the screen corebox to size with as close tolerances as it was possible to obtain with the regular metal corebox. Thus to compare results it was necessary to know the ratio of the volumes of the two boxes. This was determined by filling each box with mercury and weighing the amount of mercury contained. Mercury was used as its surface tension is high enough to prevent it from leaking through the 200-mesh screen. A 1 x 1-in. sheet of paper was placed at each end of the regular corebox to prevent the mercury from leaking through the commercial vent screens. The weight of the mercury pressing against the paper provided an effective seal.

Since the mercury did not wet either corebox it was difficult to determine at what point the volume of the mercury was equal to the volume of the respective coreboxes. The (*Please turn to page* 156)









Ceramic Molds
FOR THE FOUNDRY

The author discusses present and potential uses of various types of ceramic materials as permanent molds for casting metals. Methods of making the molds and properties of typical ceramic materials are described

CERAMICS can be briefly described as essentially natural materials of the earth which may be modeled, molded, troweled, cast, or otherwise fabricated into useful articles. They normally comprise different quantities of metallic oxides, but are chemically classed as "nonmetals."

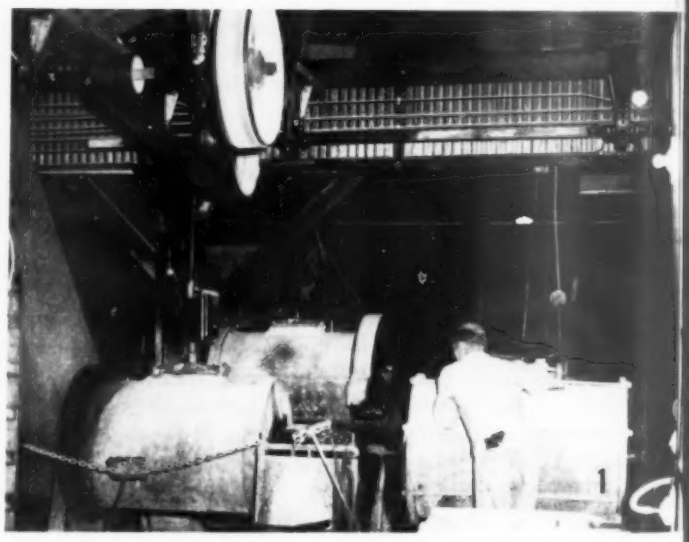
Among the ceramic products that are well known to foundrymen are refractory furnace components and crucibles for melting alloys of all types, sand molds, and plaster composition molds for investment casting. These particular products merit no more than passing mention in this article, since they have provided subject matter for many previously published works. However, it is believed that their proved usefulness has at least established the potentialties of ceramic mold materials in terms of the following properties:

1. High heat resistance combined with low thermal conductivity.
2. Relatively great chemical inertness at temperatures required to melt a majority of commercial alloys.
3. Very good fabricational qualities which permit the manufacture of accurate molds with comparatively few defects and related difficulties.

Generally speaking, these desirable properties have thus far been regarded as practical in the fabrication of temporary molds, each of which could produce no more than a single casting. However, a number of foundrymen are known to have made use of permanent ceramic molds, and there is every reason to predict that many similar applications will be developed as the facts about modern ceramic materials become generally known.

Principal types of ceramic materials can be identified and defined as:

1. Glass—comprising fused sand, quartz, and metallic-oxide compositions.
2. Porcelain enamels—comprising mixtures of glass and clay compounds, which can be fused on metal surfaces to prevent corrosion and other undesirable chemical reactions.
3. Clay products—comprising heat-fused clay or clay compounds such as pottery and structural brick.
4. Refractories—comprising mixtures of clays, gypsum cements, etc., which have probably the highest melting points of any group of materials now known to exist.



Of these, glass materials appear to have the fewest probable applications in the fabrication of permanent molds for casting metals—despite the proved usefulness of temporary sand molds—since they will normally melt at comparatively low temperatures and have relatively low resistance to thermal shock. However, research workers at California Institute of Technology have reported some success in the use of quartz-glass molds for the precision-casting of zinc, aluminum and other alloys in the intermediate temperature range.

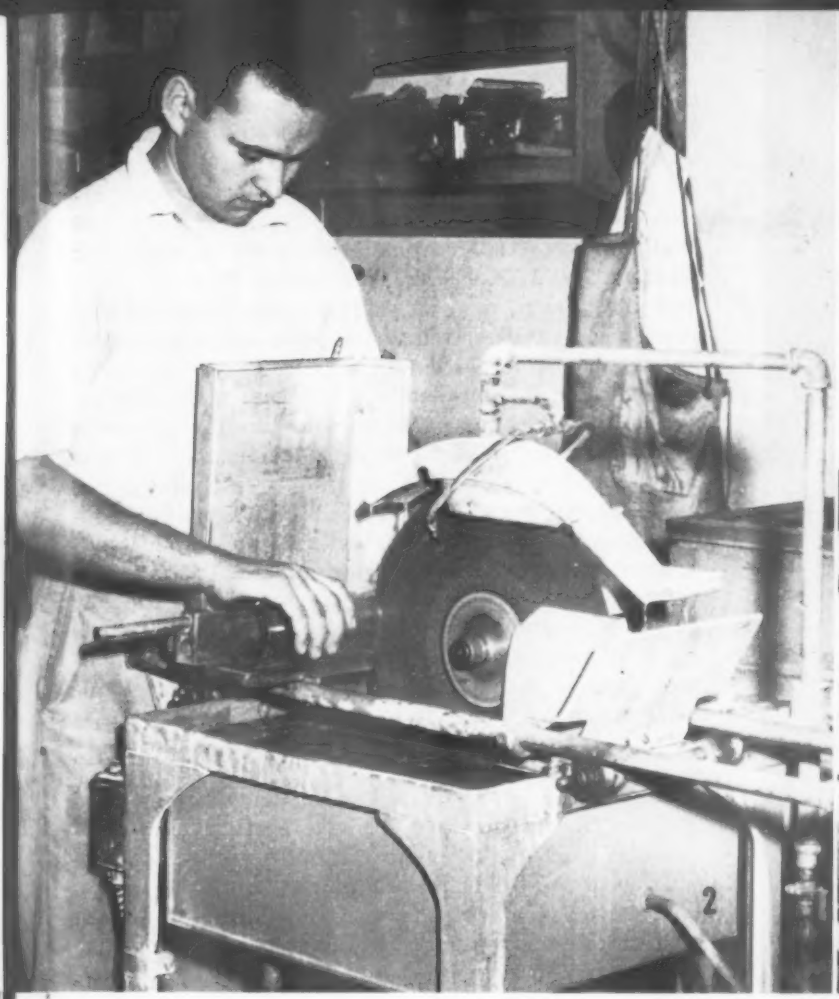


Fig. 1—Raw ceramic materials are finely ground and readied for use by mixing with water

Fig. 2—Surfaces of a cylindrical quartz-glass mold are ground with a rubber disk and mild abrasive solution, prior to use in casting metals

Fig. 3—Refractory "piece molds" are readied for use in making intricate casts. Molds of this type are permanent to the extent that they can be used to make 25 to 50 castings from alloys in the intermediate-temperature range

By THOMAS A. DICKINSON

For the latter experiments, molds were of the open type and alloys were melted in the mold cavities to minimize the danger of damage due to thermal stresses. Vitreosil was the quartz-glass composition used in making the molds, and it was cast in the molten state over preheated refractory patterns. The molds had a coefficient of thermal expansion of only 5.0×10^{-7}, and each was capable of producing 10 to 25 identical castings without appreciable deterioration. The castings had exceedingly smooth and homogeneous surfaces, but were necessarily rather small and simple in design.

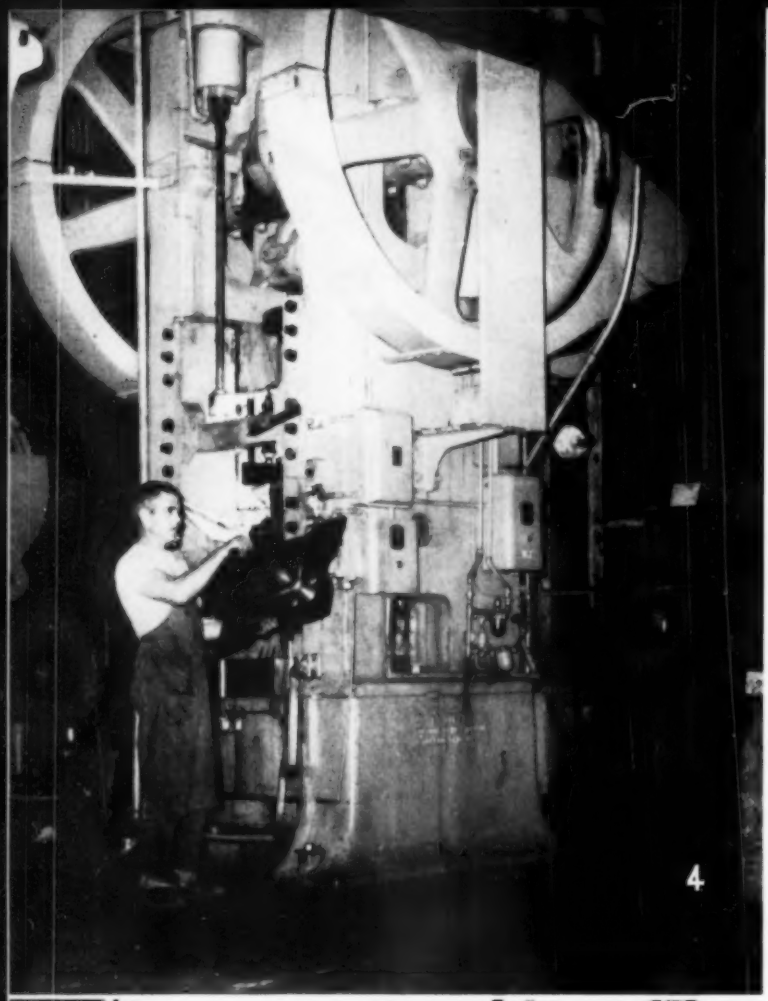
At Lockheed and other western aircraft factories, porcelain-enameled steel molds are being used with some success for the casting of moderately large and symmetrical shapes with alloys in the low and intermediate temperature ranges. Sheet steel is first press-formed to produce a metal cavity by applying hydraulic pressure to a rubber "blanket" so that the rubber will sandwich the steel over a form block or pattern (made from cast plastics, low-melt alloys, etc.). Then the steel sheet cavity is cleaned or degreased, etched with an acid pickling bath, and coated with porcelain enamel as follows:

A ground or base coating (comprising porcelain enamel frit mixed with adherence oxides and water) is sprayed onto the steel, dehydrated at temperatures of about 200° F, and fused into the steel surfaces at a temperature of about 2500° F.

A cover coating (comprising about 95 per cent zirconia, mixed with clay and water) is sprayed over the ground coating, dehydrated as noted above, and fused at temperatures of 2500° F or more into the ground coating.

A seal coating (which is essentially the same as the ground coating) is thinly applied over the cover coating, then dehydrated and heat-fused as noted above for the initial coating.

Sheet steel cavities, thus enameled, may or may not be stiffened with a cast-alloy backing medium before they are coated and can resist temperatures up to about 1500° F, as necessary, to produce an indefinite number of castings without acquiring cracks or distortion. Stock for drawing the cavities usually



comprises 16 to 20 gage enameling grade steel sheets. The enameling compositions were initially developed by the National Bureau of Standards, Washington, for use in improving the heat resistance of jet-propulsion airplane parts. (See NACA Technical Note 1626 available from the National Advisory Committee for Aeronautics, 1724 F St., Washington 25.)

It has been suggested that porcelain-enameled sheet steel cavities, reinforced with cast-alloy backing materials, would be suitable as long-lived molds for die casting; but, while a number of die casters are reportedly endeavoring to make use of such molds at this writing, it seems evident that such work has not yet progressed beyond the trade-secrets stage.

To date, few (if any) western foundries have endeavored to acquire the firing-kilns and other facilities required to heat-fuse clay and related types of ceramic materials into permanent casting molds. However, a number of companies have found it possible to have such molds made to order by specialized ceramic manufacturers at apparently-reasonable prices.

Develop Successful Methods

Among the latter firms Pacific Clay Products and Pacific Tile & Porcelain Co. have both acknowledged successful efforts to make ceramic molds in accordance with the following procedure:

1. Patterns are made or modeled from a porous casting plaster compound in accordance with standard patternmaking procedure.

2. If the pattern has undercuts or contours which require the fabrication of molds in two or more pieces, a separate pattern may be used for each mold piece, or areas of a single pattern may be progressively masked so that pieces can be cast thereon in appropriately dimensioned wood flasks. Otherwise, open-type molds are flask-cast on a pattern with heat-resistant clay "slip" (i.e., a clay and water casting mix).

3. Clay-slip casts are dehydrated as cavity shells, clinging to the plaster cavities. Dehydration in this case is accomplished in open air at room temperature by the withdrawal of water from the clay slip through the pores of the plaster patterns.

4. Cavity shells are reinforced with a coarse refractory backing material. Backing materials of this type are mixed with water then cast and allowed to set like concrete at room temperature, after which they will develop ceramic bonds at elevated temperatures.

5. Reinforced cavity units are fired at temperatures of about 1500 to 2000° F to fuse ceramic constituents.

6. Cavity surfaces are glazed for smoothness by applying, drying, and firing (*Please turn to page* 144)

Fig. 4—Permanent mold cavities can be drawn from sheet steel with press equipment of this type. Heat resistance of cavity surfaces is increased with a porcelain enamel finish, and reinforcements may be used to make molds sufficiently rigid

Fig. 5—A dehydrated clay-slip cast is removed from its plaster mold for kiln firing and glazing

By H. F. JAMES

High Strength Aluminum-Magnesium Alloy CASTINGS

CHARACTERISTIC mechanical properties of aluminum sand casting alloys have restricted their field of application to lightly stressed components. Where appreciable stresses are encountered it is usual to employ wrought components produced as forgings or fabricated from rolled or extruded bar or sheet. It is considered, however, that the comparatively high cost of sinking forging dies could be obviated to a greater degree than currently is general if more advantage were taken of the higher strength casting alloys where operating temperatures are not likely to exceed 250° F.

One of the most interesting light metal casting alloys is the aluminum-magnesium alloy containing 10 per cent of the latter and known by the designation No. 220. Properties of this alloy in the fully heat treated conditions are designed under specifications SAE 324, AMS 4240A and ASTM B26-48T as: Minimum tensile strength 42,000 psi, and minimum elongation 12 per cent.

This combination of tensile strength and ductility is of sufficient value to warrant the attention of designers; but there is no doubt that in some instances they have been discouraged by inability on the part of founders to produce castings having the requisite properties. In most instances this was the result of failure to appreciate the degree of control over the minutiae of technique necessary for the successful production of castings in this somewhat sensitive alloy.

Once the guiding principles are understood there is no reason why an experienced founder of good quality light metal castings should not obtain satisfactory castings. The following notes are intended to guide founders engaging for the first time in production with this alloy.

In the first place, it is essential that the alloy used should be free from impurities beyond those occurring in virgin aluminum of at least 99.7 per cent purity. Only magnesium is added and it is recommended that until a steady run of satisfactory production is achieved, no secondary metal or process scrap should be added to the melt. For the actual melting an electric resistance furnace having a graphite crucible is the most satisfactory, although, provided reasonable care is taken, an oil-fired crucible furnace can be used, or one of the recently developed types of smaller induction furnaces. In order to avoid the necessity of ladling the metal, it is desirable that lip-axis pouring furnaces should be used and the molds brought to within easy reach of the furnace on conveyors or platform trucks. The molds can then be fed directly from the melting crucible. If for any reason it is essential to employ a ladle, particular care must be taken to avoid delay or agitation when transferring the metal.

The optimum casting temperature varies slightly in accordance with the weight and displacement of metal in the castings being produced, but normally the temperature of the metal as it enters the molds should be 1275° F, with a safe margin of plus or minus 15° F. Excessive fluxing is to be avoided, as with other aluminum alloys, but the employment of a covering flux, composed of 70 per cent sodium chloride and 30 per cent calcium chloride, is recommended. Preparation of the molding sand requires continual control. The relatively high magnesium content of the alloy necessitates close regulation of moisture content to prevent the occurrence of intercrystalline oxidation. In addition, it is recommended that an inhibitor be employed. For this purpose an addition of 6 to 8 per cent by weight of boric acid is suitable. A suitable molding sand is obtained by adding about 75 per cent by weight of synthetic quartz sand, or lake sand having a somewhat similar sieve analysis, to normal molding sand. Typical sieve analyses are:

Percentage Retained on:	Molding Sand	Quartz Sand
50 mesh	3	17
70 mesh	17	58
140 mesh	56	25
270 mesh	11	..

Clay content of the molding sand would be below 10 per cent. Although the molding sand is naturally bonded, the addition of the other sand necessitates the employment of a synthetic bond. The quantity of bond added should be 5 per (*Please turn to page* 196)

CUPOLA DUST

Concluding his discussion of methods for collecting cupola dust emissions, the author describes various types of equipment employed for this purpose. The first article was presented in the February issue

By WILLIAM N. WITHERIDGE
Ventilation Consultant
General Motors Corp., Detroit

THE VARIETIES of gas cleaning equipment for use with the foundry cupola are practically unlimited. For this reason, the following list of systems chiefly refers to the methods of applying such equipment and of operating the cupola. Some of these groups may be further subdivided according to the methods of dust separation, and whether operated dry or wet, or with a dry-wet combination.

Type A—Open Top Cupola

1. Deflection cap, cone, or baffle; natural draft (reference 1).
2. Expansion-gravity separator; natural draft.
3. Induction-expansion chamber; natural draft (Fig. 4).
4. Deflection-expansion chamber; natural draft (Figs. 5 and 6).
5. Centrifugal deflection-expansion; natural draft (Fig. 3).
6. Gas downflow; mechanical exhaust from side to cleaner.

Type B —Closed Top Cupola

1. Closed charging door or port; airblast-powered gas cleaning system (pressure method).
2. Open charging door; constant volume mechanical exhaust to cleaner (suction method).
3. Closed charging door; constant volume mechanical exhaust to cleaner, air bypass for draft compensation (suction method).
4. Closed charging door; variable-speed mechanical exhaust to cleaner, interlocked to blast air blower (suction method).

Open Top Arrangements—One of the earliest types of spark and cinder control, which is still in use, is the "birdscreen" arrester, generally applied to the circular space between a weather cap and the top of the stack (Type A-1). Since the screen must be coarse enough to prevent excessive resistance to gas flow, it cannot retain any but the largest chunks of material reaching that level. Even less effective are chains suspended from the rim of a weather cap.

Type A-1 also includes the deflection of heavy particles toward the side of the stack by substantial baffles or inverted cones mounted below the top of the stack.

In view of the relative coarseness on the micron scale of a large portion of the solid constituents, it has been possible to precipitate from 50 to 75 per cent of the dust load from the gas stream by a simple expansion chamber or cylindrical shell "telescoped" over the top of the stack (Type A-2). The addition of a water spray inside this chamber increases the amount of finer particles that can be deposited, and makes use of the water for hydraulic disposal of the dust.

The annular space between the collector shell and the cupola stack is either open or closed at the base, depending on the method of handling the dust or sludge, and whether it is desired to induce air from the atmosphere for cooling the gas by dilution (assuming that combustion will not take place at the point of air induction—which in fact has been observed to occur in a few cases). Type A-2 is the closed-shell method, and Type A-3 (Fig. 4) uses the open shell for air induction[24]. Entwisle & Gass, Bolton, England, designed an induction type A-3 arrester with a square expansion chamber, which was described in 1932[13].

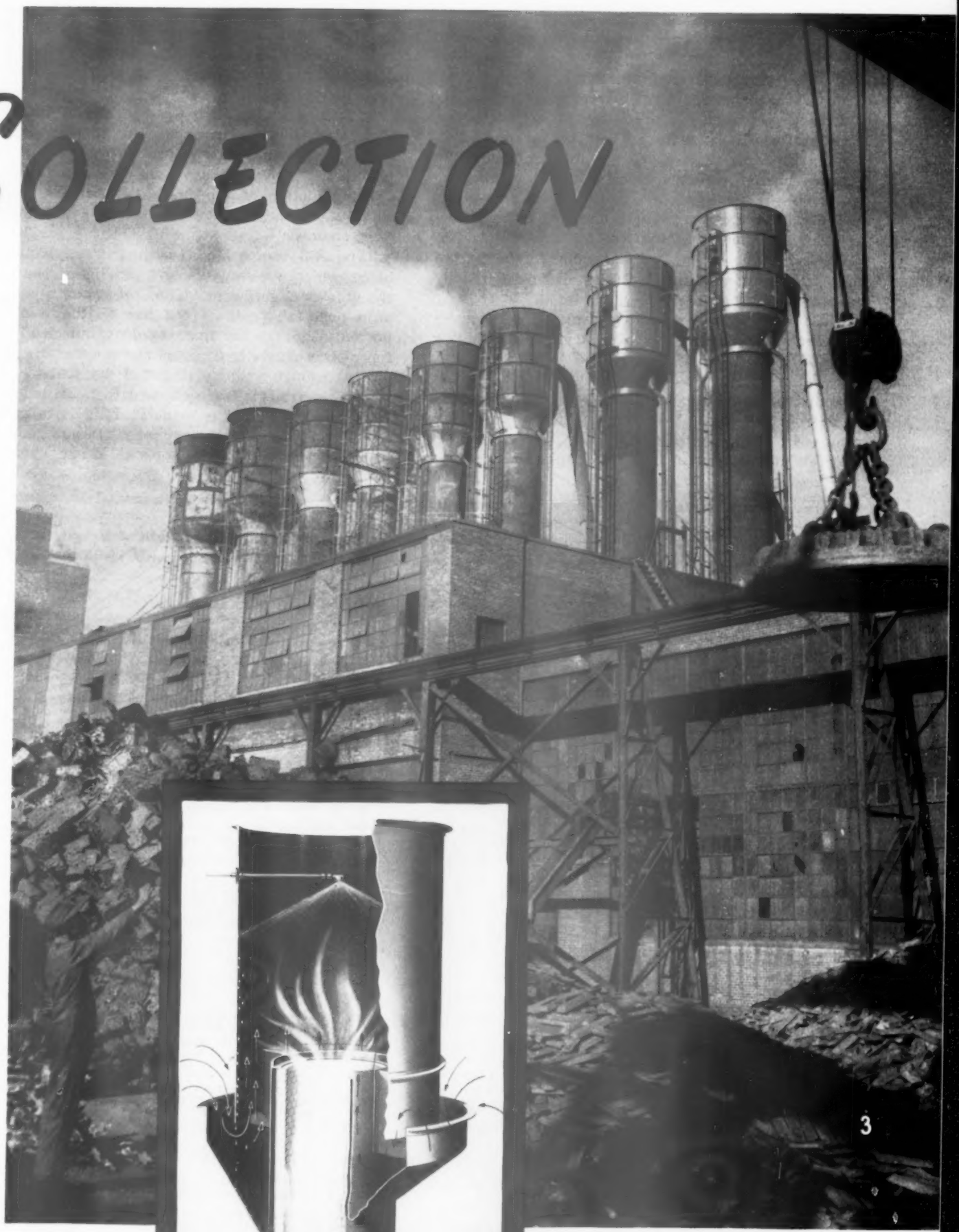
If a cone is mounted above the stack inside an expansion chamber or "hood" (Type A-4), it is possible to augment the deflection-expansion process by the addition of water sprays or sheets. The free area between the rim of the cone and the shell is usually from 2 to 4 times the area inside the cupola stack at its top. This is the general class to which most of the current methods of cupola dust collection belong. Water has been applied in numerous ways, somewhat as follows (subdivisions of Type A-4):

a. Open water line centered above apex of cone.

Fig. 3—Wet dust collectors on two No. 12 and six No. 11 cupolas at foundry of Pontiac Motor Division, General Motors Corp. (Type A-5)

Fig. 4—Induction-expansion wet dust arrester based on design by E. A. Piper (Type A-3). Photo courtesy C. O. Bartlett & Snow Co., Cleveland

COLLECTION



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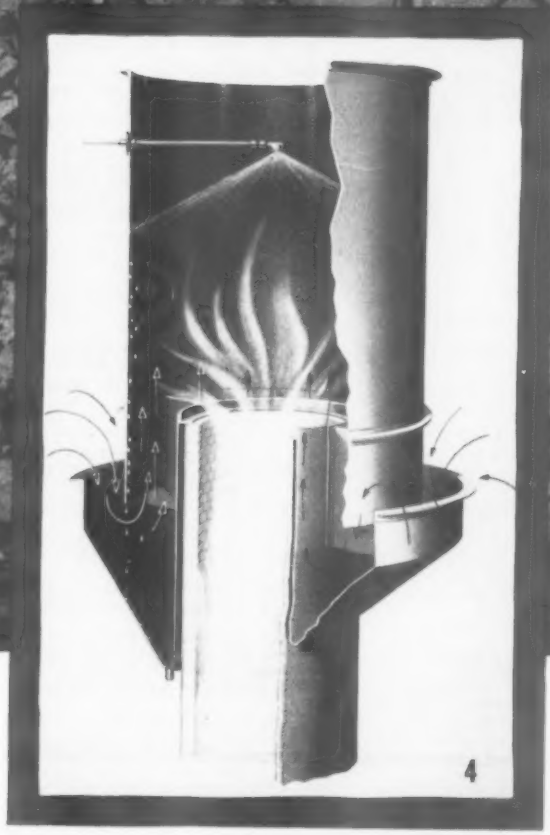

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water flow by gravity.

b. Single spray nozzle mounted above apex of cone (Fig. 6).

c. Cluster of nozzles above and near center of cone, arranged horizontally or vertically.

d. Ring of nozzles above cone inside shell and directed toward cone (care must be taken in this case to use wide-angle spray patterns to avoid gaps between nozzles through which gas may escape unwashed).

e. Cone made hollow, water discharged from hole in apex and flowing downward by gravity[14].

f. Cone made hollow, water issuing in sheet from continuous slot at periphery (slot size regulated by spacers fastened at intervals).

g. Cone made hollow, water issuing from nozzles mounted at periphery (original system at Buick Motor Division, GMC[15]).

h. Small removable water-distributing head mounted above main cone, water issuing at low pressure from an adjustable slot at periphery of small cone (Fig. 5).

A few installations of the deflection-expansion type A-4 arrester have been made without the use of water, and arranged to serve two cupolas, either simultaneously or alternately. In this case the dry dust is funneled into a hopper placed at any convenient level[16].

In Type A-5 (Fig. 3) the gas passes into the center of a stationary centrifuge where it is mixed with air and water and forced outward toward the collector shell. The auxiliary airstream producing the swirling motion of the gas is supplied by a blower with its discharge duct connected tangentially to the swirl chamber[17].

Type A-6 represents a method of mechanical exhaust which does not require closing of the top of the stack. A sufficient volume of exhaust is applied at a point above the stock line so that air enters not only through the charging door, but also into the top of the cupola[18]. The gas and air mixture is then drawn through suitable stages of dry and wet cleaning. This system has been used to a limited extent, but excessive heat has made it difficult to maintain the moving parts of the equipment in good condition. This, of course, would apply also to Types B-2,

TABLE III—Summary of Weight-Ratios in Cupola Operation

(Usual or recommended ranges are shown; when upper and lower limits are known, they are given outside the parentheses)

Weight-Ratios	Symbols	Ranges	Comments
Iron/coke—"coke ratio," "melting ratio," "fuel ratio"	Fe/Ck	4 (7-10) 14	Does not include "bed-coke"
Iron/carbon	Fe/C	5 (8-11) 16	Assuming C = 0.9 Ck; see AFS *Handbook*, p. 78-91, for charts on cupolas of 36 to 72-in. lined diam
Air/carbon	Ab/C	5.7 (7-10) 11.5	30 to 100% "combustion efficiency" in producing CO_2; see AFS *Handbook*, p. 100-101
Air/coke	Ab/Ck	5 (6-9) 10.5	90%-carbon coke
Air/iron	Ab/Fe	0.5–1.5	Non-oxygenated blast; about 13,000-39,000 cu ft per ton of iron at 60 F; low ratios with hot blast
"Stage of combustion" (carbon dioxide content of the effluent gas from the combustion zone)	Co_2/Gc	0 (10-15) 21	This ratio is related to: combustion efficiency, melting efficiency, temp. of molten iron, losses of silicon and manganese; see AFS *Handbook*, p. 99-102, 376-377. Note that this is not CO_2/Gs when charging door is open
Nitrogen/air	N_2/Ab	0.75	For dry air; use in checking ratio Gc/Ab below
Nitrogen/combustion gas	N_2/Gc	0.63–0.68	Use nitrogen as "tracer" in computing mass flow relationships for gases
Combustion gas/air	Gc/Ab	1.2–1.1	"Combustion gas" as used here is also known as "effluent gas" with reference to the combustion zone
Combustion gas/carbon	Gc/C	7 (8-11) 13	
Combustion gas/coke	Gc/Ck	6 (7-10) 11.5	
Combustion gas/iron	Gc/Fe	0.6–1.8	
Gas mixing ratio (induced air) / (combustion gas)	Ai/Gc	0–9	Both mixing and dilution ratios depend on size of charging door if open, strength of updraft, height of stack, resistance of dust collector; will be high with low melting rates in large cupola lined below charging door to a diameter considerably smaller than rated size
Gas dilution ratio (stack gas) / (combustion gas)	Gs/Gc	1–10	
Slag ratio	Ws/Fe	0.05–0.10	Includes iron loss
Sulphur pickup	Sz/Sa	1.4–1.6	40 to 60% of aggregate sulphur content in iron and steel charged; AFS *Handbook*, p. 54
Sulphur dioxide concentration in stack gas	SO_2/Gs	0.00005–0.0005	0.005–0.05% by wt., 50–500 ppm by wt., approx. 25–250 ppm by volume
Dust/iron	Di/Fe	0.005–0.025	0.5-2.5%; 10-50 pounds per ton of iron melted
Dust/combustion gas	Di/Gc	0.005–0.015	0.5–1.5%; 5–15 pounds per kilopound of gas or air; more significant than Di/Gs, which is subject to wide variations due to induced air at charging door
Dust concentration in stack gas before cleaning	Di/Gs	0.0005–0.025	0.05–2.5%
Dust concentration in stack gas after cleaning	Do/Gs		
Water/stack gas	L/Gs	0.2–2.0	Note that Gs does not include amount of air induced above cupola stack by dust collector itself
Overall efficiency of dust collection system; see ASME Power Test Code for Dust-Separating Apparatus; PTC-21.47-1941	$E = Dd/Di$ $E = Dd/(Dd + Do)$ $E = (Di - Do)/Di$ $E = \frac{Di/Gs - Do/Gs}{Di/Gs}$		Estimates of relative efficiencies of various types of cleaning systems against cupola dust are not in order at this time. Assuming in the last formula that no change has occurred in the mass flow of gas through the cleaning system

B-3, and B-4, in the absence of substantial gas cooling by dilution with air, or by vigorous washing ahead of the exhaust fan.

Closed Top Arrangements—The closed top system (Type B-1) described by Drake, Kennard, and Saylor[19], approaches in principle the favored method of handling blast furnace gas, which is a by-product of sufficient value to warrant a high standard of cleanliness[22, 23]. This system practically reverses the conventional method of cupola operation. Instead of side charging of stock and top removal of gas, their arrangement provides for top charging of stock through an "air-lock" chamber containing a charging "bell", and side removal of gas from this chamber. The gas is forced through at least two stages of cleaning—first dry, then wet, by the pressure created by the blast air blower.

Type B-2 is a relatively simple method of producing a closed top system of dust control[22]. The suction method with sufficient exhaust air and gas volume has the advantage that the charging door may be left open without danger of gas escape at the charging level. Furthermore, any leaks developing in the system will result in an inward flow of air at those points, which prevents the escape of toxic carbon monoxide gas into the foundry. This system requires the use of an exhaust fan to draw gas into the cleaning equipment, and the cupola cannot be operated if the exhaust fan is out of order.

The quantity of dilution of combustion gas, which has an important bearing on the size of dust collecting equipment, can be regulated by the size of the charging door or by partially closing the door between intermittent periods of charging.

Type B-3 is similar to Type B-2, but permits closing of the charging door in the event of intermittent charging. It requires an air bypass arrangement between the cupola and gas cleaner to admit air to the duct in an amount similar to that entering the charging door when open. Since the admission of air would burn gas rich enough in carbon monoxide and high enough in temperature, such a draft bypass device would require an especially effective heat resistant construction, as also would the exhaust duct to the gas cleaning system. Thus it would not be chosen in preference to Type B-2 unless heat suppression near the charging door were imperative.

Furthermore, the hazard of "flash-backs" or sudden explosive ignition of gas meeting air entering a bypass or inlet bleeder, if carbon monoxide were well above the lower explosive limit of 12.5 per cent, would seem to place this method in a most unfavorable light compared with prompt burning of the gas at the charging door. On the other hand, if the gas is kept in a well closed (*Please turn to page* 220)

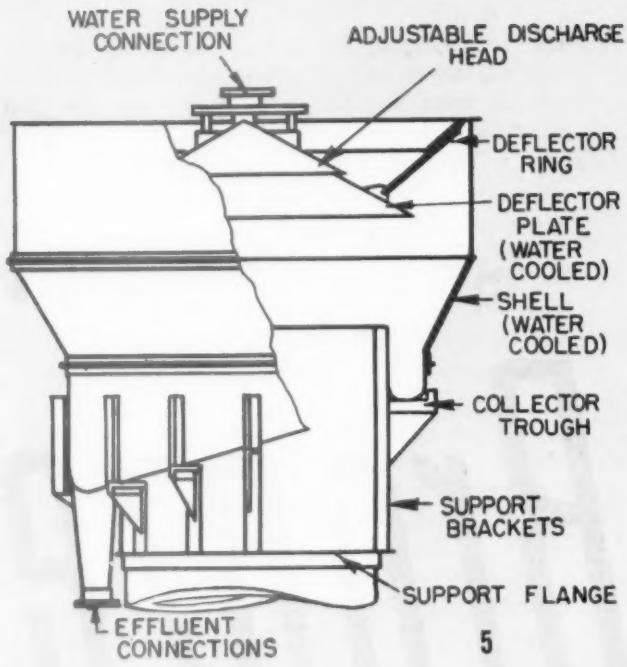

Fig. 5—This adjustable water-discharge head is for a wet dust collector of Type A-4. Illustration courtesy Claude B. Schneible Co., Detroit

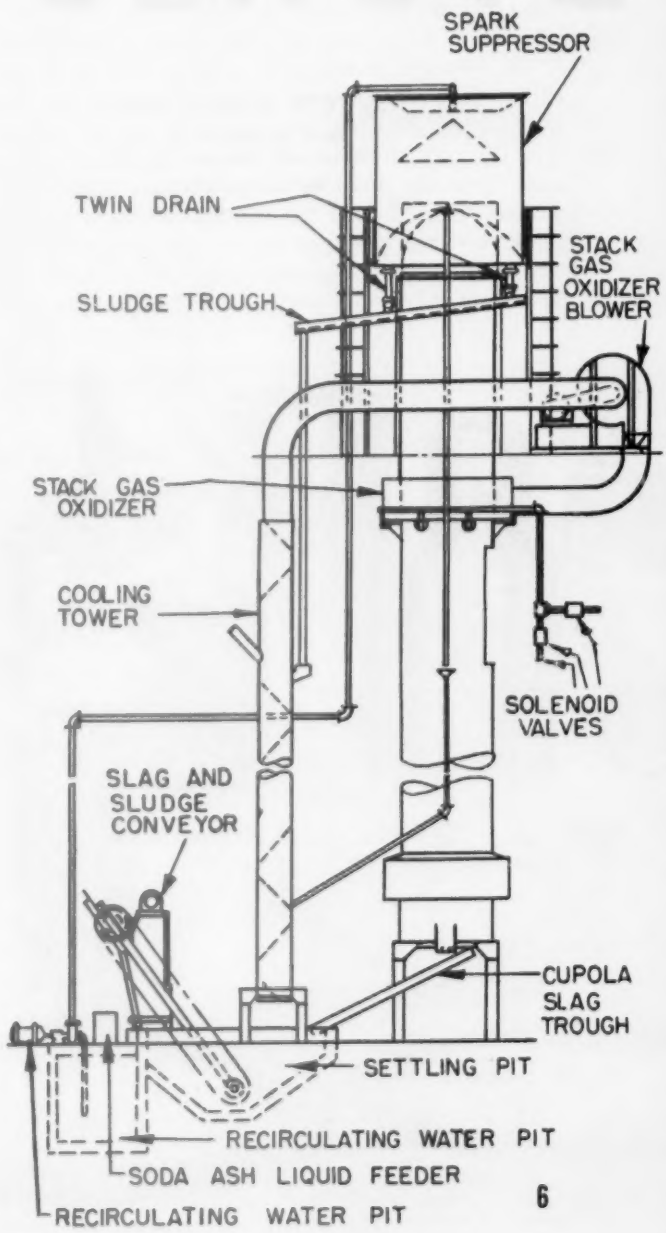

Fig. 6—Assembly of cupola with spark arrester (Type A-4), stack gas oxidizer, cooling tower for scrubbing water, settling pit, and water recirculation system. Illustration courtesy Whiting Corp., Harvey, Ill.

SPECTROMETRIC ANALYSIS OF Bronze

By PETER J. GRUSZECKI
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SPECTROCHEMICAL analysis of bronze alloys has been developed in an independent laboratory to extend the range of the instrument to very high percentages. This article describes the technique and the analysis of lead, tin, zinc, and nickel in bronze alloys.

Tables illustrating the lines used, operating conditions, and the accuracy to be expected of the quantitative determinations of the elements are presented.

The prime reasons for the growing popularity of spectrographic equipment today, are the fast and accurate methods of analysis. Its principal asset is in the speed and ease with which large quantities of samples can be analyzed. This is true whether the material to be investigated and analyzed is ferrous, nonferrous or nonmetallic in solid or liquid form.

The spectrographic equipment installed at Continental Motors, Muskegon, Mich., and the techniques employed in setting up and analyzing steel and cast iron have been described previously.[1] This paper presents a procedure for the rapid analysis of bronze material containing tin and lead, which is used in automotive, aircraft and marine engines for bushings, bearings, guides, and in general wherever resistance to wear is paramount. The types and ranges of alloys are given in Table I.

Since spectrographic standards for bronze are not available in solid form at present, which would require a minimum of preparation and ease the process of standardization, we had to rely upon control samples, which were repeatedly checked and analyzed chemically by a routine method in our laboratory. These control samples were selected for spectrograph-

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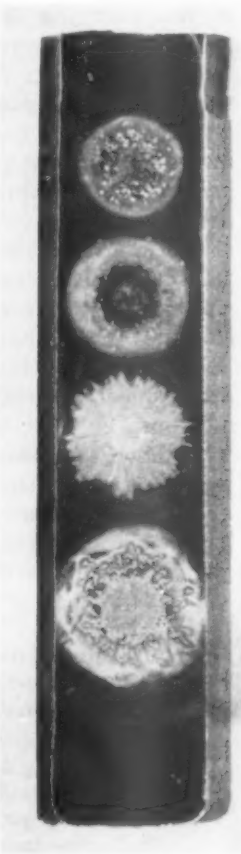


ic use after the chemical analyses revealed a variation from the actual composition to produce the necessary analytical range for the expected composition of bronze material to be analyzed.

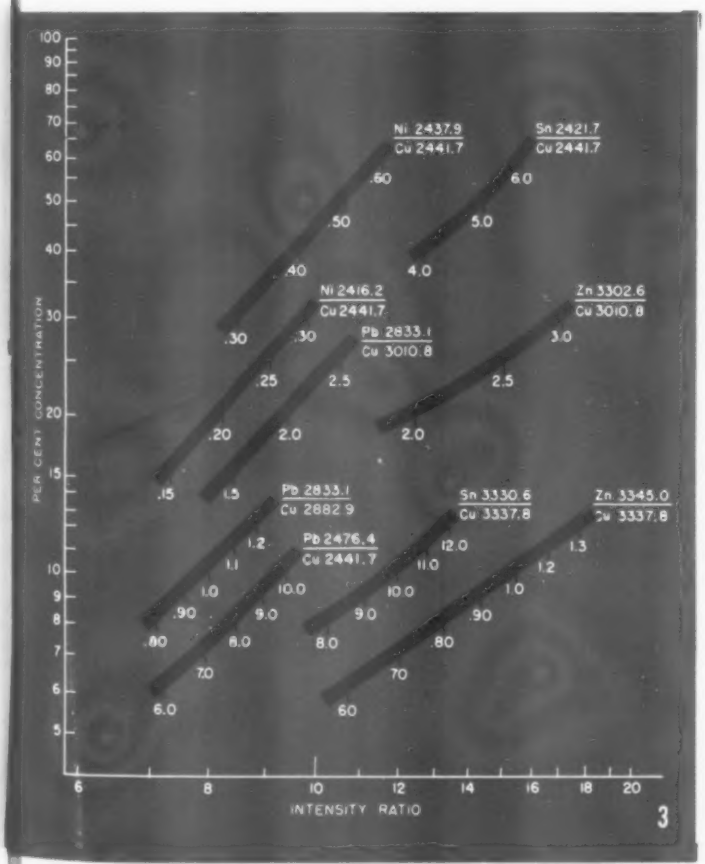
In a routine procedure, millings for wet analysis were taken from the sides of the various specimens, providing a flat surface for the spectrograph. These samples were then ground off on an abrasive wheel, and polished on metallographic paper No. 1, thus providing the smooth surface which we found necessary for the spectrographic analysis. The specimens were sparked on the Petrey stand, using the point-to-plane technique, which is a rapid one.[2] The flat surface method of analysis of bronze material merited attention to provide rapid control of the quality entering into the product of the manufacturer. Fig. 1 shows the various types and shapes of samples analyzed.

The A.R.L. multi-source unit,[3] capable of producing numerous and varied types of electrical discharges, was used to excite the samples. An analytical scrutiny was made from the standpoint of convenience, sensitivity and reproducibility achieved with a single exposure for the analysis of all the major and minor elements. The data in Table II give the types of discharges and operating conditions investigated.

Fig. 1—Illustrating various types of samples sent to the spectrographic department for analysis

Fig. 2—Typical appearance of burns produced on specimens using the four types of discharges

Fig. 3—Curves for oscillatory spark, showing intensity ratio of spectrum lines indicated to internal standard lines, as function of percentage composition



The typical appearance of burns produced on the specimens is illustrated in Fig. 2. It shows the pattern left by the types of discharges used on the bronze sample. The numerals correspond to the values of the circuit conditions used with the source.

Desirable conditions are produced only by having a constant and stable spark. A great many spectrum observations and studies were made before it was decided to adopt and maintain an oscillatory spark discharge, with a 20-second exposure and a 30-second preburn; i.e., a preliminary period of sparking prior to the exposure, to attain a constant condition of the spark.

On the basis of precision and general suitability, the multi-source conditions were selected at: Capacitance—1 mfd, inductance—25 muh, and resistance—1 ohm. These settings gave a greater improvement in accuracy and precision than other combinations. By utilizing higher amounts of capacitance, inductance and resistance in the power current, it produced greater amperage and heating of the samples, resulting in variations and inaccuracies.

For high concentrations of these constituents, good reproducibility is required of the method if it is to be of any practical value. Numerous samples were sparked and the average deviation of intensity ratios calculated. Table III shows the data of the method for the four samples tested for precision.

Repeatability results are presented, showing that characteristic reproducibility of the A.R.L. spectrograph falls within the limits required for industrial control. The average deviation of intensity ratio for the eight exposures is less (*Please turn to page* 146)

TABLE I—Nominal Compositions of Various SAE Alloys, Per Cent

Alloy	Tin	Lead	Zinc	Nickel	Copper
62	9.00–11.0	0.35	1.0–3.00	1.00	Balance
63	9.00–11.0	1.0–2.50	0.75	1.00	Balance
64	9.00–11.0	8.0–11.0	0.75	0.50	Balance
65	10.0–12.0	0.50	0.50	...	Balance
620	7.50–9.00	0.30	3.0–5.00	1.00	Balance
660	6.25–7.50	6.0–8.00	2.0–4.00	0.50	Balance

TABLE II—Operating Conditions Studied and Circuit Constants Employed

Operating Conditions

Upper electrode	Flat surface of sample
Lower electrode	¼-in. graphite rod, 120° cone
Spark gap	3 mm
Lens	5 in. cylindrical
Slit width	60 microns
Grating aperture	0.8 opening of grating doors
Film	Eastman Spectrum Analysis No. 1
Developer	D—19, three minutes
Prespark discharge	10 seconds
Exposure	30 seconds

Circuit Constants

	C	L	R	Circuit	Discharge type
1.	1 mfd	25 muh	1 ohm	oscillating	spark-like
2.	5 mfd	100 muh	10 ohm	critically damped	spark-like
3.	5 mfd	480 muh	100 ohm	overdamped	spark-like
4.	40 mfd	480 muh	25 ohm	overdamped	arc-like

This article outlines the organization and functions of the metallurgical laboratory in a nonferrous jobbing foundry producing aluminum and copper-base alloy castings. It describes the various benefits accruing to the foundry and its customers from improved metallurgical practices

The Metallurgical LABORATORY

In a Nonferrous Jobbing Foundry

By W. A. MADER
Chief Metallurgist
Oberdorfer Foundries Inc.
Syracuse, N. Y.

THE BURDENS placed upon nonferrous foundries have increased tremendously during World War II and the postwar period. The highest quality nonferrous castings are now demanded for comparatively lower prices than prior to this period. Factors responsible for these heavier burdens are: High labor costs, high material costs, stricter customer inspection standards, application of statistical quality control methods by the customer, material shortages, increased competition, and scarcity of skilled foundry labor.

The effect of these factors can be reduced by successful use of the metallurgical laboratory in applying metallurgical methods in the nonferrous foundry.

Successful application of the metallurgical laboratory is considerably more difficult to achieve in the jobbing type of nonferrous foundry than in the production foundry. Most orders received by the jobbing foundry are for small runs from a particular pattern. This factor generally does not allow for "second-guessing." The castings usually must be sound the first time they are made since the margin of profit is lost if it is necessary to repeat the run. Also, many different types of castings must be made with the methods and materials available; these may not be the best for each specific casting. But if properly applied, with the assistance of the metallurgical laboratory, they will give sound castings acceptable to the customer.

Most nonferrous jobbing foundries are relatively small, and economical considerations such as overhead costs do not warrant expenditures for large laboratories with complicated metallurgical and quality control setups. Yet the customer generally demands and requires as high a quality on his short-run castings as on his high-production parts, since poor-quality castings increase his costs through lost machining time, poor product, etc. Therefore, while the metallurgical laboratory is additional overhead in the nonferrous jobbing foundry, it is necessary if the foundry is to meet competition successfully under today's quality standards. Companies purchasing castings from foundries unable or unwilling to apply correct metallurgical methods to their operations may expect costly deviations from quality standards.

The metallurgical laboratory described here is organized with the individual units as indicated on page 97. The sand laboratory, illustrated in Fig. 6, is equipped with approved American Foundrymen's Society sand testing equipment such as tensile and compression testing machine, permeability meter, gas analyzer, core and mold hardness testers, balance and scales, ro-tap, standard sieves, muller, core oven, etc. It is equipped and used to test incoming materials used in the various sand and core mixes, such as sands, clays, core binders, mold sprays, mold washes, glues and pastes. Methods are also developed in the sand laboratory for the use of these materials in production, and assistance is given to the coreoom and molding department in the proper application of these methods and materials to produce sound castings. Some of the work initiated by the sand laboratory has included development of improved and more economical core sand mixtures, better core baking control, and use of washed core sands to reduce core costs and improve casting quality.

Since sand and the various mixtures of sand are the medium from which molds are made (in the sand foundry), and the mold determines the physical shape of the casting and many of the casting properties, heavy emphasis is placed on the testing of sand and related materials in this foundry.

The physical test laboratory, Fig. 4, contains a

Office of the metallurgical laboratory, Oberdorfer Foundries Inc., Syracuse, N. Y., incorporates a section devoted to the design of the most efficient gates and risers for castings being produced

15,000-pound testing machine and a brinell hardness testing machine with necessary accessories. Castings and test pieces are checked for hardness and tensile properties in this laboratory. Many of the tests are performed on castings purchased by various government agencies and customers to their specifications and, therefore, this laboratory is necessary to check the material for compliance with specifications. Tests are also performed on various commercial alloys as a quality check. When a new type of alloy is to be placed in production, the physical properties are studied by casting test pieces and checking the tensile, brinell hardness and other properties. The brinell hardness test gives an excellent check on the properties of heat treated aluminum alloy castings.

The metallographic laboratory contains grinding, sanding and polishing wheels, a metallograph and binocular microscope to examine microstructures and macrostructures of the nonferrous alloys used in production. Examination of the microstructures is practically indispensable in controlling the heat treatment of aluminum alloys. Defective solution-heat treatment of these alloys can be readily detected by microscopic examination, disclosing either evidence of eutectic melting or undissolved microscopic constituents.

A small electric oven automatically controlled to within close temperature limits is used in this laboratory to develop new heat treatment methods and assist in checking present methods by heat treating test specimens and examining their microstructure with the above-mentioned metallographic equipment.

The trend in the aluminum casting industry today appears to be towards the heat-treated, high-strength aluminum alloys. These alloys require close metallurgical control. Macrographic examination is very useful in determining soundness and causes of unsoundness in the copper-base alloys. Excellent use of the metallographic section has been made in the development of new type alloys in the foundry, particularly the high-strength aluminum alloys.

The x-ray section of the metallurgical laboratory

is equipped with a 250,000-volt machine, a dark room and film processing equipment. Fig. 3 shows the x-ray equipment in use for examining an aluminum alloy accessory housing. This section has proved to be the most important division of the laboratory with the possible exception of the sand laboratory. Casting defects undisclosable to the eye can be readily detected by using the x-ray equipment. Gating and risering methods to be used for manufacturing sound castings which will machine correctly, withstand pressure test and service loads, are developed by x-raying sample castings and making any necessary changes required.

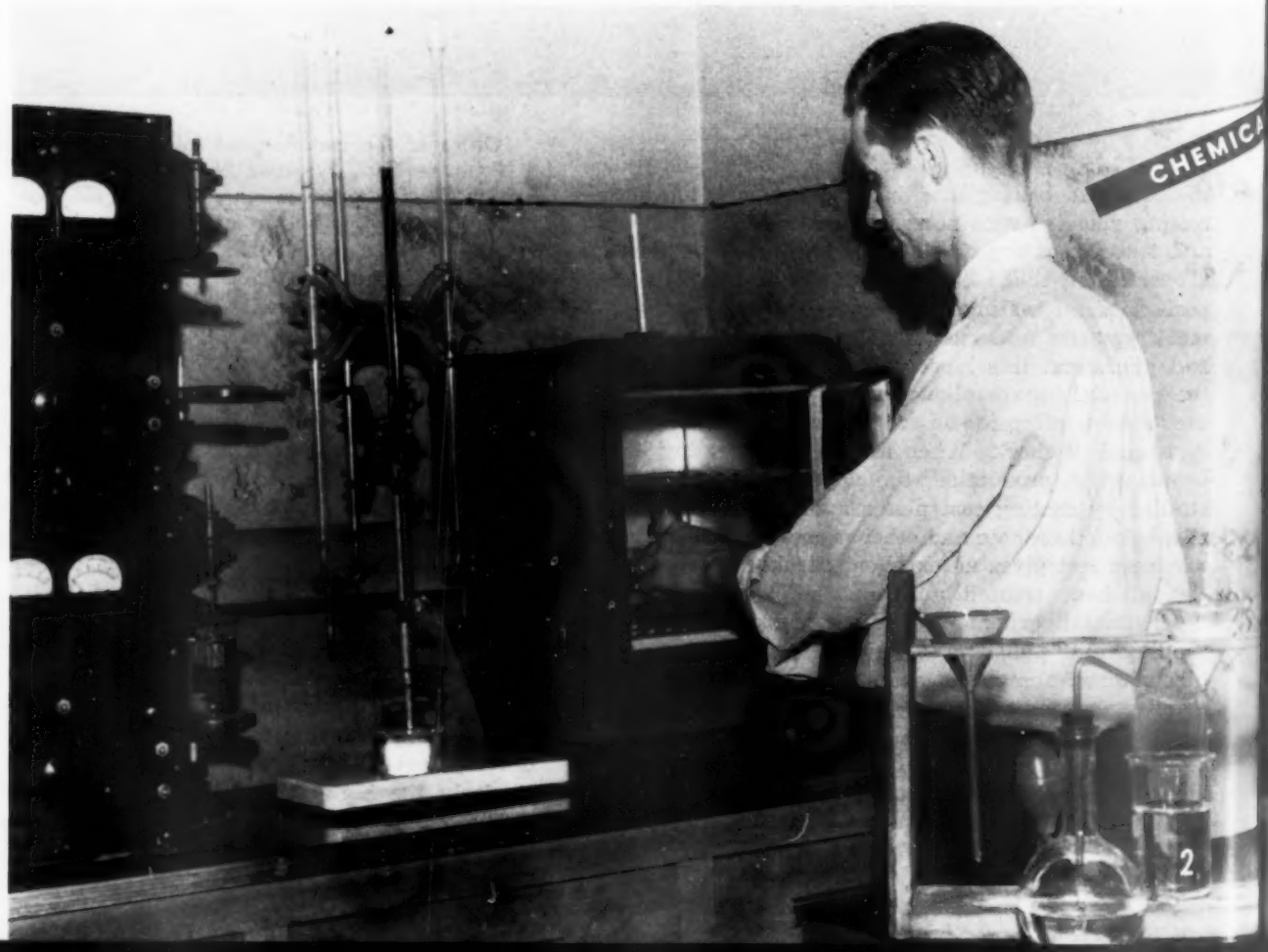
Production runs are also spot-checked by x-raying representative castings to determine casting quality. Customers have found this of so great a value that they have often forwarded iron and steel castings to our laboratory for examination when difficulty was encountered with these castings and the vendor foundry lacked x-ray equipment. The x-ray laboratory has proved a great help to the foundry in correcting internal defects before excessive scrap losses occur. Castings that must be especially sound—for example, when even a low percentage of scrapped castings causes high machining losses—may be x-rayed 100 per cent or sampled by statistical methods.

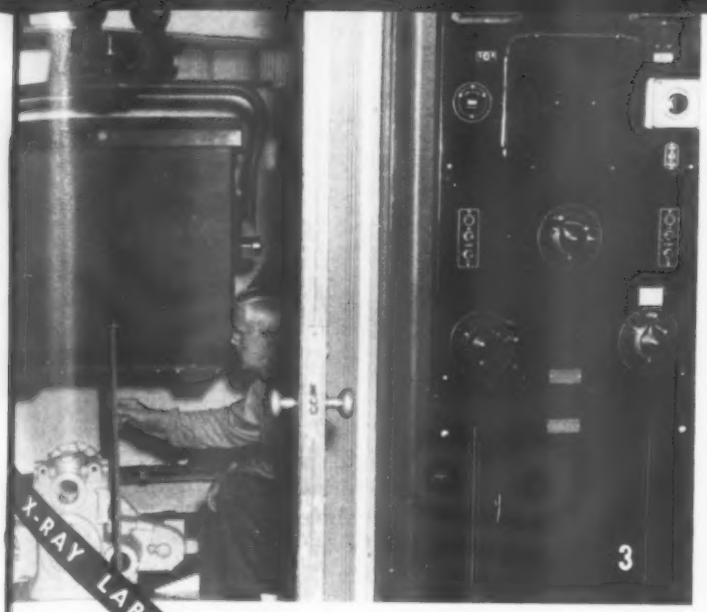
The spectrographic laboratory section contains a quartz prism spectrograph, a multi-source unit, a densitometer and accessory equipment, including a dark room with film processing equipment. This equipment is used mainly to check the compliance of aluminum casting alloys with the company's and customers' specifications. It is also useful in segregating alloys and detecting small amounts of impurities in aluminum and copper-base alloys. The chemical laboratory section is equipped with sampling equipment and the usual chemical apparatus for wet methods of analysis and is used to determine if copper-base alloys meet specifications. It is also used to check aluminum alloy spectrographic standards which, after checking, can be used for analyzing unknown samples of like material.

The spectrographic laboratory furnishes accurate, rapid results on aluminum alloys, greatly decreasing the cost and increasing the value of the analytical results. As many as 200 complete analyses have been completed with this equipment in a single eight-hour shift. These sections have materially reduced difficulties caused by use of off-analysis material. Fig. 5 is a view of the spectrographic laboratory and Fig. 2 shows some of the chemical laboratory equipment.

The laboratory office, Fig. 1, contains working space for the secretary, chief metallurgist, and draftsman for gating and risering design. Incorporating a gating and risering design section in the laboratory as in this foundry is unique in the industry. However, the management feels that this foundry technique is so closely related to other factors affecting the metallurgy of nonferrous castings that it should also be a part of the laboratory's functions.

Sketches are made of the gating and risering method to be used on the pattern for all large orders to guide the patternmaker (*Please turn to page* 230)





X-RAY LABORATORY

PHYSICAL TEST LABORATORY

GATING DESIGN

SPECTROGRAPHIC LABORATORY

ABORATORY

ABORATORY

SAND LABORATORY

CHIEF METALLURGIST

Questions AND

Cast Iron To Resist Abrasion

Q.—We operate a foundry making sugar mills, chaff cutters, etc., and would like a book which describes the details of making cast iron articles with steel parts imbedded in them.

A.—We regret that your inquiry does not give sufficient information on what is meant by cast iron articles with steel parts imbedded in them. Possibly you are referring to what are called attrition mills which grind materials between two plates with raised teeth on their surfaces. The plates are called grinding disks or plates. In this country they are cast in one piece of a type of iron known as "white iron"—that is, one which when broken shows a white fracture. It is a low-silicon cast iron, and a suitable composition would show about 0.70 per cent Si, 0.20 per cent P, 0.70 per cent Mn, and about 3.0 per cent TC. Such iron, while somewhat brittle, is extremely resistant to abrasion. Addition of 0.25 to 0.50 per cent Mo is said to increase the toughness. An alloy cast iron for the purpose contains about 4.5 per cent Ni, 2 per cent Cr with around 1 per cent Si; adjusting the Si according to section thickness.

Metal Penetrates Into Core

Q.—We are having some trouble with our large brass castings where the brass penetrates and honeycombs the core. These cores are from 2 to 8 in. in diam, and the castings are in the form of flanged bushings from 8 to 15 in. long with wall thicknesses up to 3 or 4 in. We do not believe the trouble is due to temperature as we have tried varying it, but believe it due to the sand formula. We have been using oil binder with pure sharp sand of medium coarseness. We paint the cores with a standard wash recommended for the purpose.

A.—Your difficulty with penetration probably is due to the coarseness of the core sand which results in an open or porous surface on the cores. The condition may be corrected in several ways. First, try a finer grade of sand to reduce the size of the pore spaces. If that is not feasible, the same results may be accomplished by additions of molding sand, clay, bentonite or silica flour to the present sand.

If you do not wish to change from your present procedure in core sand and practice, penetration may be eliminated by applying a coating on the core surface to fill up the interstices between the sand grains. While you mention you are using a core wash, it evidently does not serve the aforementioned purpose due to lack of body or density. To fill the surface pores it will be necessary to make a paste of graphite (or your present coating material if dry) with molasses water, linseed or core oil, or dilute sodium silicate solution, and rub it thoroughly into the surface of the core. The core then is dried or baked to eliminate the moisture. With high-lead or high-phosphorus content alloys it may be necessary to apply two coats, drying between each. Still another remedy for penetration is to wrap the core in thin sheet asbestos.

Weight of Coke Is Variable

Q.—In a copy of the *Foundrymen's Handbook* published in 1929 we note that in one place it is stated that a good foundry coke will run from 32 to 34 lb per cu ft while in another place the weight of dry coke is given as 23 to 32 lb per cu ft. If those are correct it would mean that a good foundry coke contains from 7 to 23 per cent moisture, which seems high. Which of the figures is correct?

A.—Values for the weight of coke are presented in various handbooks, and cover a considerable range. Mark's *Mechanical Engineers Handbook,* for example states that the weight of loose coke is from 26 to 30 lb per cu ft. Latest figures we have seen are those given by Mulcahy in an article on foundry coke which appeared in the November, 1944 issue of THE FOUNDRY. He indicates the following weights for different grades: No. 1 Foundry—24.30 lb per cu ft; No. 2 Foundry—25.12 lb per cu ft; No. 3 Foundry—25.35 lb per cu ft; No. 3 Foundry and Nut—28.60 lb per cu ft; Ind. Egg—26.60 lb per cu ft; Blast Furnace—28.00 lb per cu ft; Egg—27.40 lb per cu ft; Nut—28.80 lb per cu ft, and Pea—28.40 lb per cu ft. Additionally it should be pointed out that the weight per cubic foot of coke varies with the specific gravity, size, shape and moisture content.

Wants Information on Cupola

Q.—We are planning installation of an 18-in. inside diam cupola and would like to have information on the height and depth of the windbox, blast pressure, blast pipe diam, and the wind volume. We notice in one book that for a 24-in. cupola 3 x 6 x 14-in. tuyeres are suggested. Does this mean that the tuyere is 3 in. high and 6 in. wide at the outside of the lining and flares to a width of 3 x 14 in. on the inside of the lining? Also is it measured as 6 in. of arc or chord? Would it be permissible for the windbox to enclose the tuyere openings or should the air be led through ducts? Does the windbox serve the same purpose as a receiver in high-pressure work?

A.—On the smaller cupolas the tuyere area usually is 20 to 25 per cent of the cross-sectional area of the cupola which, in the case of the 18-in. diam size, would be from 50.8 to 63.5 sq in., or in round numbers 48 and 64 sq in. We believe that the smaller figure will serve adequately, and that will provide four tuyeres,

ANSWERS

each 3 x 4 in., or 4 in. in diam if circular type is desired. Wind should be supplied at the rate of 570 cfm at a pressure of 8 oz. Windbox may surround the cupola and enclose the tuyeres as you mention, or it may be attached higher with individual ducts leading to the tuyeres. Size of the blast pipe will depend largely on the outlet diameter of the blower, and probably will be around 6 in.

Windbox, according to one authority, should have the capacity of at least one second's supply of air which, based on the rate of 570 cfm, would be 9½ cu ft. Hence, a windbox 2 ft high and 6 in. wide should serve. As you mention, the windbox is employed similarly to a receiver in a high-pressure system, in that it theoretically eliminates surges and provides air at constant pressure.

Information you mention on the tuyere size has been interpreted correctly. The 3 x 6-in. area on the inlet or outer side of the lining is the area used in determining the tuyere ratio. Flaring to the 3 x 14-in. area is claimed to provide a softer blast than when the cross-sectional area is the same throughout. Since measurements on cupolas are not held to close tolerances, those of the tuyeres usually are determined on the chord rather than the arc.

Permanent Molds for Aluminum

Q.—We intend to manufacture an aluminum vegetable slicer with a plain base ⅛ x 5 x 14 in. At first we were going to make it in green sand, but after study decided that it can be made in a permanent mold without difficulty. What type of iron would serve as the permanent mold material? Also there appears to be considerable business in this district in making molds, and we contemplate installing a small cupola to make our own molds as well as for others. Molds weigh from 200 to 600 lb. Can you give us the necessary information on melting and handling the best type of iron for this purpose?

A.—As might be expected, there is considerable diversity of opinion on what constitutes the most desirable composition for a permanent mold; it ranges from a plain gray iron to one containing appreciable amounts of alloying agents. Available information indicates that the following analyses have been found satisfactory: Si 2.50 to 2.70 per cent, TC 3.30 to 3.50 per cent, Mn 0.60 to 0.80 per cent, and P 0.30 to 0.40 per cent; Si 1.8 to 2.0 per cent, TC 3.2 to 3.4 per cent, Mn 0.8 to 1.0 per cent, P 0.25 per cent, and Cr 0.20 per cent; Si 1.8 per cent, TC 2.9 per cent, Mn 1.0 per cent, P 0.20 per cent, Cr 0.60 per cent, Mo 0.70 per cent, and Ni 2.75 per cent; Si 3.2 per cent, TC 3.4 per cent, Mn 0.25 per cent, P 0.10 per cent, and Mo 0.60 per cent; Si 1.25 per cent, TC 3.75 per cent, Mn 1.25 per cent, and Mo 1.0 per cent.

With reference to your remarks about installing a small cupola to make your own molds, and molds for others, our suggestion is to let sleeping dogs lie, and stick to the field in which you have had experience. Production of satisfactory gray iron castings involves considerably more than just obtaining a melting unit and a pile of molding sand. It requires skill and know-how, and obtaining that often is a rather costly procedure.

Gases in Mold Cause of Holes

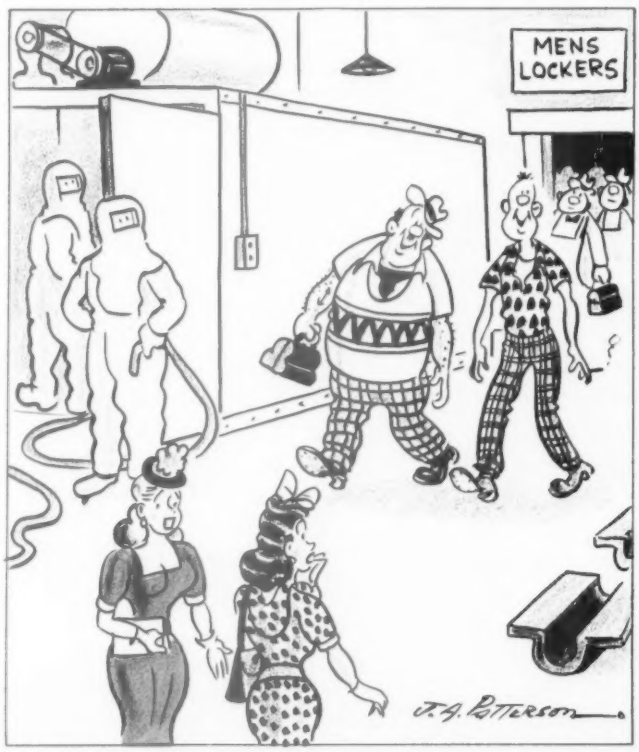
Q.—We have considerable trouble with some of our small gray castings in the range of 3 to 5 lb, and are sending you one of them to give you an idea of what we refer to.

A.—Casting submitted for inspection is similar to a flange. Large diameter is 5½ in. and thickness about ⅞-in. Smaller diameter is 3½ in. and thickness 1 in. Both are cored out, the larger containing a 1-in. hole and the smaller a 2¼-in. hole. Face of the large-diameter section is machined off, showing a surface permeated with discolored holes ranging in size up to 3/16-in. in diam. We believe that the holes result from steam generated in the mold which does not escape freely. Observation of other surfaces shows imbedded particles of sand as well as a couple of lumps or protuberances of metal, both of which indicate disturbance of the sand usually caused by high moisture or hard ramming.

While no information is given on the method of molding, it appears to us that the flange is molded

GANGWAY!

By J. A. PATTERSON



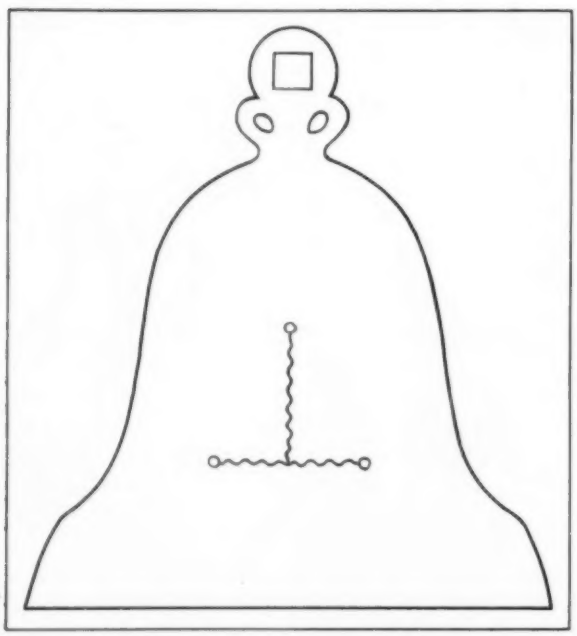
"They looked pretty good in their sand blast suits—I never wondered how they'd look in street clothes!!"

mainly in the cope with the large diameter resting on a flat drag. If that is the case, the trouble may be caused by using too tight a bottom board which does not allow the steam to escape freely. It also might be due to the sand being rammed too hard or the moisture being slightly on the high side. Our preference would be to mold the flange casting with the small diameter down; all in the drag with a flat cope. If the molding is done that way, the holes shown will result from the latter two causes mentioned previously—that is, from hard ramming which reduces the permeability, or from the sand being a little too damp.

Repair a Cracked Bronze Bell

Q.—In our collection we have a mission bell which carries the date and inscription *Maria Ora Ron Bis A.D.* 1787. The bell is cracked as shown in the accompanying free-hand sketch. The defect, of course, spoils the clarity of tone. Roughly estimated, the weight is about 90 lb. The clapper has a ring for attaching a pull cord. This would seem to indicate the bell was not mounted for swinging, although a square hole in the upper part, suggests the use of a square suspension bar. Oxidation in the crack shows the presence of copper, but a small fragment accidentally broken off the lower edge shows an almost white fracture. The edge of the lower rim, rubbed bright from moving on a concrete floor, shows a distinct brass color. Do you think the crack can be repaired by welding? Will the welding operation restore the original tone?

A.—The bell may be repaired by any welding firm equipped with the necessary apparatus and familiar with welding nonferrous metal. To equalize expansion and contraction strains the entire casting should be raised to red heat. The crack must be ground or chiseled to a *V* shape before the welding rod is applied. A small hole drilled in the solid metal at each end of the crack will prevent the crack from traveling any farther.



Bell crack extends in two directions

Before the welding torch was developed, foundrymen, ferrous and nonferrous, occasionally repaired cracked or broken castings by the *burning-in* process. The affected part was ground or chipped to expose bright, clean metal. Then a stream of hot metal was directed into the cavity until the solid metal in the vicinity was melted. While one or two men manipulated the ladle, a third man plunged the end of a bent rod into the cavity and felt along the surface. With a little experience he could tell when the desired union had taken place. Pouring ceased and the liquid metal, projecting slightly above the casting surface, was covered with dry sand, ashes or any other insulating material. Later, usually on the following day, the surplus metal was chipped and ground down flush with the surrounding surface. Since the diameter of the bell and the thickness of metal are factors in determining the final tone of a bell, it is probable that a repaired bell will not produce the exact former tone.

Gas Holes Appear Under Skin

Q.—We are having some difficulty producing flange-like brass castings similar to the specimens forwarded you. The rejections occur after machining when the gas holes appear, and we do not know where the fault can be placed, either in the metal as purchased or in our method of production. We use 85-5-5-5 ingot, melt in No. 50 crucible with a charcoal cover using coke with forced draft, and pour around 2100 to 2150°F. We use No. 1 Albany sand which is conditioned with a little core compound and molasses. Molds are vented top and bottom, and dried against drying stoves. We also are enclosing a sketch showing gating and feeding of the castings. Flasks are 12 x 18-in. with 3-in. copes and drags.

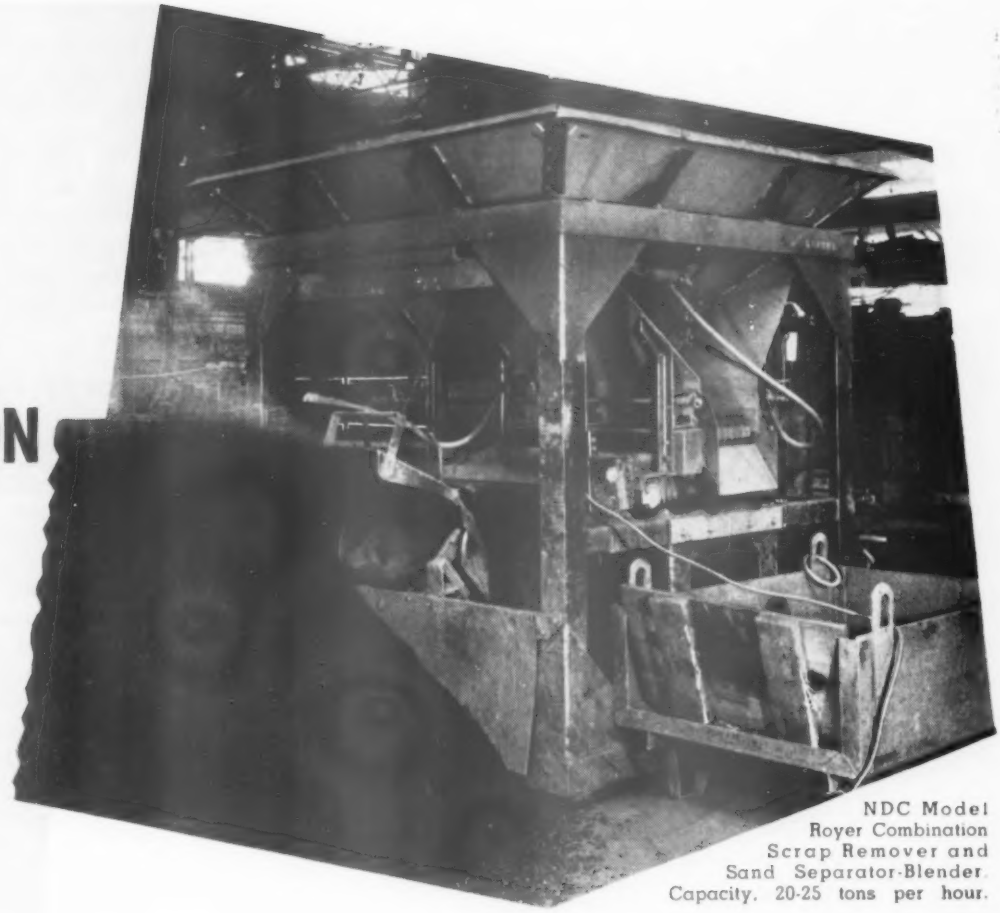
A.—Study of the holes appearing on the machined surfaces of the castings submitted for examination indicate that they are the result of mold gases or steam, since the interiors are dull and dark colored. While you mention that you dry the molds, you must remember that it actually is only a skin-drying operation, the depth of drying depending on how hot the mold stove is, and how long the molds are left in position. Consequently, it is possible that some of the molds have only a superficial skin-dry, and they tend to kick back. It also should be pointed out that the kick back, disturbance or fluttering is only a small amount but, of course, sufficient to make the castings defective.

However, we believe from examination of the sketch showing the gating and risering that the main cause of the trouble is overcrowding. It shows only about 3/16-in. of sand between flask and casting, casting and casting, and runner and castings. Even if the mold were dry throughout there would be a tendency for mold disturbance due to gas (created by the organic matter in it and the molten metal) being concentrated in a narrow confine, and not being able to escape rapidly enough. You also mention that you vent the mold top and bottom, but if tight-fitting top and bottom boards are used, the gas will not be able to

(*Concluded on page* 102)

Better
PRODUCTION

Better
FOUNDRY SAND



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Royer Combination
Scrap Remover and
Sand Separator-Blender.
Capacity, 20-25 tons per hour.

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ROYER COMBINATION

SCRAP REMOVER and SAND SEPARATOR-BLENDER

THE HARD WAY

Hand shoveling of foundry sand—especially in a medium or large size foundry—is doing it the *hard way*—a slow, wasteful and expensive operation. It makes sand preparation costs higher than most foundries can afford in a competitive market for castings. Put *your* sand department on a low cost basis by installing a Royer Combination.

Royer Combinations are portable . . . can be moved from bay to bay with an overhead crane (or sand can be carried to Combination in a grab bucket). It removes all burnt cores and other forms of scrap *automatically* . . . combs, blends and thoroughly aerates sand . . . provides correct moisture distribution . . . increases permeability 10 to 20 points . . . produces a light, uniform sand for highest quality molds and cores. Available in 20-25 ton-per-hour and 40-50 ton-per-hour sizes. Write for full information.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.
159 PRINGLE ST., KINGSTON, PA.

Questions AND ANSWERS

(*Concluded from page* 100)

escape as freely as necessary to avoid trouble. Vents must be open to the atmosphere if they are to function.

Our suggestion would be to use at least a 14 x 14-in. flask which would permit 1¼ in. of sand between flask and castings, and between castings. Place a 1½-in. diam sprue in the center and gate directly from it into the castings, using a gate of the same thickness as the casting and 1 in. wide. This would reduce the gating system to less than half of what is shown in the sketch, and save considerable money. Incidentally, we believe that the risers shown on your sketch are of little if any value since they are filled with the first and coldest metal. Proper location with the system of gating shown is to place the risers on top of the runner at the junction of the gates or branches.

Also we believe that the castings can be made in green sand without the necessity of skin drying as presently practiced. Sand, of course, should be worked on the dry side and not rammed any harder than necessary. Also, if you want to continue your present method of skin drying by the stove method, try leaving out the core compound and molasses in the sand as mixed, and spray with only molasses water just before drying. The less organic matter you have in your sand, the better off you will be.

Improving Castings' Surface

Q.—We are interested in improving the as-cast surface of cast iron and brass, and would like to know what literature is available on foundry sand, both naturally and synthetically bonded. Is any literature available on facings, either proprietary or otherwise?

A.—Over a period of years a considerable number of articles dealing with molding sands have appeared in various publications, but so far as we know there is no book on the subject. It also might be pointed out that the various properties such as permeability, moisture content, green and dry strengths, etc., will have to be developed to fit your particular shop conditions. Possibly the suppliers of foundry sands and sand bonding materials may have literature of interest to you.

Smooth surfaces on gray iron castings usually are obtained by employing a thin layer of facing sand containing seacoal or other carbonaceous material with or without wood flour. Seacoal preferably is the grade nearest the grain size of the sand being used, and the amount may vary from 2 to 10 or more per cent by weight. However, too much of the material tends toward veining or mapping on the casting surface. If you wish to avoid the use of facing sand, you will have to experiment with finer sizes of sand, and use the finest which will provide sufficient permeability to permit the escape of gases generated. Moisture content also will have to be ajusted so that the sand in the mold is not too dry or too wet.

Obtaining a smooth surface on brass castings essentially depends on selection of the finest possible grain size which will not result in blows from lack of permeability. In the case of both gray iron and brass, it might be wise to enlist the service of your sand supplier since he undoubtedly has wide experience along that line. As far as literature on facings is concerned, we suggest that you write to the various manufacturers whose names and addresses are available in the advertising pages of THE FOUNDRY.

Chunky Cores Hard To Remove

Q.—We have experienced some difficulty in preparing a proper mixed core sand for sand casting aluminum gear housings, etc. Our cores are very hard and extremely difficult to remove from the casting. If possible we would like to have information on a suitable mixture which will overcome our troubles.

A.—Large chunky cores which practically are surrounded by molten metal must possess the necessary rigidity and strength for handling and resisting the flow of the metal, but must collapse readily when the contraction stresses of the casting take effect. Such cores also must possess reasonable permeability and be well vented to the outside of the mold to carry off any gases which are generated. Without knowledge of your present practice we cannot make any suggestions on changes which might overcome the trouble. However, either of the two following mixtures should serve satisfactorily:

One mixture is composed of 800 lb washed silica sand of 65 fineness, 200 lb bank sand of 90 fineness, 8 lb cereal, 20 qt water, 2 qt kerosene, and 2 to 5 pt core oil. Amount of oil to be used will depend upon the dry strength required. Another mix is composed of 37 per cent by weight of bank sand of 90 fineness, 63 per cent burned or used core sand, and 2 per cent pitch core binder.

Bismuth Alloy Has Low Shrink

Q.—Will you please supply us with the correct ingredients and the proper smelting process for casting small "no-shrink" white metal master patterns.

A.—So far as we know there is no alloy which does not shrink or expand to some extent on solidification, but some of the high-bismuth alloys exhibit little change in volume. For example, those containing 48 to 55 per cent bismuth show little change; but below 48 per cent they shrink and above 55 per cent they expand. Also, bismuth alloys containing 33 to 66 per cent lead expand on solidification.

It is our understanding that an alloy containing 48 per cent bismuth, 28.5 per cent lead, 14.5 per cent tin, and 9 per cent antimony shows little change in volume from liquid to solid state. We suggest that you write to producers of bismuth for information on a bismuth alloy which will meet your requirements. Those alloys have comparatively low melting points, and can be melted in an iron ladle over a gas burner. Since you indicate the desire to form accurate patterns, we suggest that you use plaster of paris or gypsum cement molds for their production.

How to get finer Cores in 4 easy lessons:

1 GET MORE GREEN STRENGTH use Krause cereal binders

2 IMPROVE FLOWABILITY AND TEXTURE use Krause cereal binders

3 PRODUCE FINER DETAIL use Krause cereal binders

4 GET EASY BURN-OUT, COLLAPSIBILITY use Krause cereal binders

Yes — the qualities you need and want are yours in Krause's Cereal Binders — TRUSCOR (light weight) and AMERIKOR (heavy weight).

So why not take advantage of all these benefits by placing your next order with any of the distributors listed below or with us direct.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wisconsin
World's Largest Millers of Dry Corn

CEREAL BINDERS

DISTRIBUTORS

M. A. Bell Co.
3430 Brighton Blvd.
Denver, Colorado

M. A. Bell Co.
401 Velasco St.
Houston, Texas

M. A. Bell Co.
St. Louis, Mo.

A. L. Cavedo & Son, Inc.
Richmond 21, Va.

Foundry Supplies Co.
Chicago 16, Ill.

J. H. Hatten
Lansdowne, Pa.

J. B. Hayes Co.
205 So. 32nd Street
Birmingham 5, Ala.

Independent Foundry Supply Co., Los Angeles 11, Calif.

Marthens & Co.
Moline, Illinois

Carl F. Miller & Co.
Seattle 4, Wash.

Milwaukee Chaplet & Mfg. Co., Milwaukee 15, Wis.

Porter-Warner
Chattanooga 2, Tenn.

Smith-Sharpe Co.
Minneapolis 14, Minn.

Snow & Galgiani
533-543 Second Street
San Francisco 7, California

Frederic B. Stevens, Inc.
Buffalo 12, N. Y.

Frederic B. Stevens, Inc.
Cleveland 14, Ohio

Frederic B. Stevens, Inc.
Detroit 26, Mich.

Frederic B. Stevens, Inc.
166 Brewery Street
New Haven 11, Connecticut

Western Industrial Supply Co.
208 S.E. Hawthorne Blvd.
Portland 14, Oregon

Men OF INDUSTRY

JOHN B. CAINE has resigned as director of research, Sawbrook Steel Castings Co., Cincinnati, and has become a technical consultant on casting problems, specializing in gating and risering, with headquarters at 322 Poplar Ave., Wyoming 15, O. Mr. Caine, who attended University of Cincinnati and Case Institute of Technology, served a two-year apprenticeship at Interstate Foundries, Cleveland, in 1924-25. He was metallurgist for Matthews Steel Castings Co., Cleveland, until 1932, when he joined Sawbrook Steel Castings Co. A member of the executive committee of the AFS Sand Division, Mr. Caine served as chairman of its Cincinnati District Chapter in 1940. He has been active in the Steel Founders' Society of America and was awarded recognition in 1945 for his outstanding contributions to the welfare of the industry. Mr. Caine has made frequent appearances as a speaker before many technical organizations, and holds membership in AFS, ASM, and British Iron and Steel Institute.

♦ ♦ ♦

Leon F. Miller, for the past 6 years sales manager of the Foundry Machine Division, Osborn Mfg Co., Cleveland, has been elected vice president in charge of sales and engineering of the division. Mr. Miller, who attended Case Institute of Technology, joined Osborn in 1929 as a junior engineer in the Machine Division. In 1934 he was assigned to field work, specializing in sand handling and treating equipment as well as foundry molding machines. Mr. Miller is a member and a former director of the Northeastern Ohio Chapter of the AFS.

♦ ♦ ♦

C. W. Hockman has been appointed superintendent in charge of foundry operations, Cadillac Motor Car Division, General Motors Corp., Detroit, succeeding **J. E. Bunch** who has been placed on special assignment in the manufacturing division. Mr. Hockman, since last March executive assistant superintendent of all foundry operations at Cadillac entered the foundry industry over 30 years ago, and has been closely associated with foundry engineering and production problems since that time. He has taken an active part in activities of the American Foundrymen's Society for the last 20 years.

♦ ♦ ♦

Ernest M. Knapp has been elected treasurer and assistant secretary, Ferro Machine & Foundry Inc., Cleveland. Mr. Knapp, who received degrees from Miami University and Kenyon College, joined Ferro Machine in 1933, where he has served as cashier and chief accountant, and as assistant treasurer since 1946. He succeeds **N. E. Gauthier** who has retired as treasurer due to ill health. **Henry B. Myers** has been re-elected vice president of the company.

♦ ♦ ♦

Hiram Brown, chief metallurgist, Solar Aircraft Co., Des Moines, Iowa, has been chosen by the American Foundrymen's Society to present the 1950 exchange paper to the Institute of British Foundrymen. Mr. Brown joined Solar Aircraft in 1946, as chief nonferrous metallurgist in the Solar Precision Casting Division, Des Moines, and later that year became chief metallurgist of the Des Moines plant. In 1948 he was appointed chief metallurgist of the company, with supervision over the San Diego and Des Moines plants. Mr. Brown was previously associated with Aluminum Industries Inc., Cincinnati, Aluminum Co. of America, Cleveland and Detroit, and Frontier Bronze Corp., Niagara Falls, N. Y. He has contributed numerous papers and articles to technical societies and the trade press.

♦ ♦ ♦

Harry Oldham, formerly general foundry superintendent, Mack Mfg. Corp., New Brunswick, N. J., has been appointed foundry superintendent, Hunt-Spiller Mfg. Corp., Boston, subsidiary of A. S. Campbell Co., South Boston, Mass. Mr. Oldham served his apprenticeship in England, where, from 1920 to 1923, when he came to United States, he was foundry superintendent, Belsiz Motors, Manchester. During a 23-year association with Ford Motor Co., he directed production of cast magnesium aircraft parts and assisted in supervision of cylinder block production.

♦ ♦ ♦

Jake Dee, owner of Dee Brass Foundry, Houston, Tex., producer of brass and aluminum castings, has been named a director of the Non-

(*Continued on page* 106)

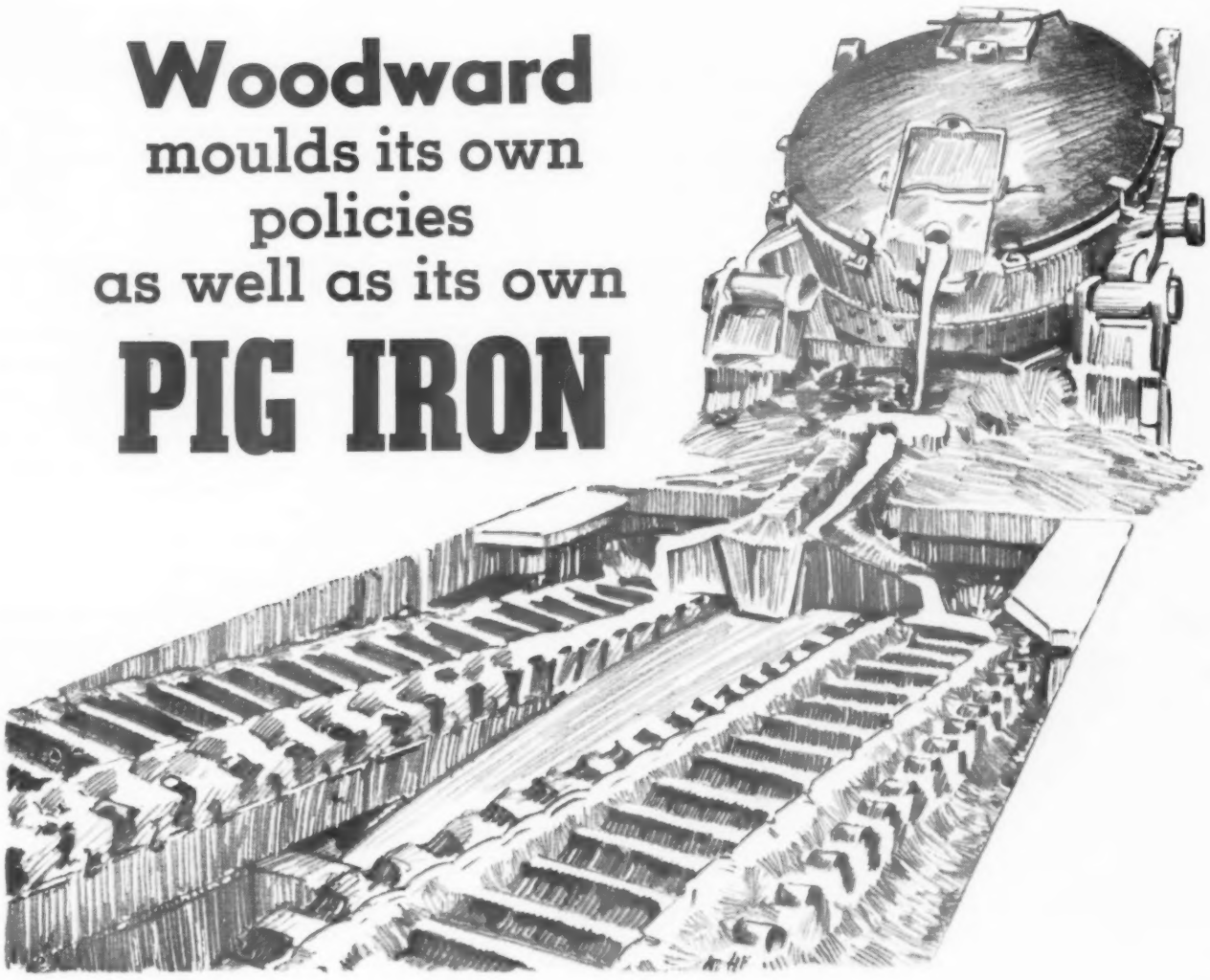
JOHN B. CAINE

LEON F. MILLER

C. W. HOCKMAN

ERNEST M. KNAPP

Woodward
moulds its own policies as well as its own
PIG IRON



Woodward Company has always taken an especial pride in the maintenance of its position as an independent iron producer. This independent policy constitutes an asset of vital value—not only to itself but to those it serves. By operating as an independent company Woodward has been able both to mould its policies and its pig iron to meet the needs of the market and the demands of its customers.

This is one of many reasons why so many independent foundries specify uniform Woodward pig iron.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1882

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

Men OF INDUSTRY

(*Continued from page* 104)

ferrous Founders' Society, Chicago, for a new district comprising Arkansas, Louisiana, Oklahoma, Texas and New Mexico.

♦ ♦ ♦

John H. Smith has been named president, General Electric X-Ray Corp., Milwaukee, succeeding **John H. Clough,** who has been made board chairman. Mr. Smith is also president and Mr. Clough chairman of the board of General Electric Medical Products Co., a subsidiary which has just moved offices from Chicago to Milwaukee. Mr. Smith, who joined the company in 1947 as assistant to the president, was formerly sales manager of General Cable Corp., New York; procurement manager, Cramp Ship Building Co., and assistant to the general manager, Schlage Lock Co., San Francisco. Mr. Clough, who will concentrate on co-ordinating basic research carried on at GE's research laboratory in Schenectady, N. Y., will establish his office in that city. He continues as a director of Newton-Victor Ltd., British associate of G-E X-Ray, and as president of G-E X-Ray Corp. of Canada Ltd., Canadian affiliate.

♦ ♦ ♦

Earl C. Hughes, vice president, Bay State Abrasive Products Co., Westboro, Mass., has been elected president of the Grinding Wheel Institute, an association composed of 28 of the leading grinding wheel manufacturers in the United States and Canada. Mr. Hughes, who was graduated from Worcester Polytechnic Institute, was engaged in the building construction field for 3 years prior to entering military service in World War I. From 1919 to 1936 he was associated with Norton Co., Worcester, Mass., leaving his position there as assistant sales manager of the Abrasive Division to join Bay State Abrasive Products Co. at that time as secretary. Mr. Hughes has retained that position with Bay State and was recently elected vice president of the company.

♦ ♦ ♦

Thomas I. Curtin Jr., recently elected president of the New England Foundrymen's Association, is president, Waltham Foundry Co., Waltham, Mass., producer of gray and high test iron castings. Mr. Curtin joined the Waltham foundry in 1932 as an apprentice bench molder and worked in all departments prior to becoming president in 1944. Active in the New England Foundrymen's Association for 10 years, he served as its vice president last year. He has also been a member of the executive committee of the Boston group of the Gray Iron Founders' Society since it was started 4 years ago.

♦ ♦ ♦

Herbert D. Twitchell and **Robert S. Thompson** have been named directors of H. P. Deuscher Co., Hamilton, O., producer of gray iron castings. Both are fourth generation members of the Deuscher family. Mr. Twitchell is the son of the late Herbert D. Twitchell, secretary-treasurer of the company from 1924 to 1927, and Mr. Thompson, who succeeds his mother, Mrs. Mildred S. Thompson, on the company's directorate, is actively engaged as an assistant to his father, Earl H. Thompson, secretary-treasurer of the company at the present time. Officers of the company include Clarence D., Ehresman, president; Herbert O. Ehresman, vice president; and Earl H. Thompson, secretary-treasurer. All three are also directors of the company.

♦ ♦ ♦

John E. Weckler has retired as general assistant superintendent of the foundry, Buick Motor Division, Flint, Mich., following 35 years of service. Mr. Weckler was born in Pittsburgh and his earlier associations were with Mesta Machine Co., Homestead, Pa., American Locomotive Co., Pittsburgh and Libster Bros., where he became foundry superintendent. Following a year with U. S. Brass & Iron Foundry in Flint, he joined Buick in 1914, where he served as general foreman, foundry superintendent, and since 1943 has been general assistant superintendent.

♦ ♦ ♦

Lewis Reiff, assistant general manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., has been named "Young Man of the Year" by the St. Joseph-Benton Harbor Junior Chamber of Commerce. Mr. Reiff received the award in recognition of his work in civic and national fund-raising campaigns, local groups and Chamber of Commerce activities. He is a director of the Michiana Chapter of the American Foundrymen's Society.

♦ ♦ ♦

Frank F. Brooks, formerly assistant plant manager of the New Castle, Pa., plant of United Engineering & Foundry Co., Pittsburgh, has been named vice president-general manager of its Lobdell-United plant at Wilmington, Del., as well as director of the company.

♦ ♦ ♦

Samuel Appelby has been appointed foundry superintendent at

(*Continued on page* 108)

JOHN H. CLOUGH

JOHN H. SMITH

EARL C. HUGHES

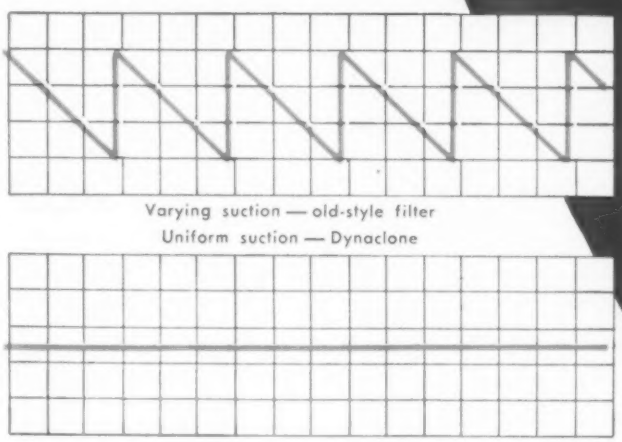
THOMAS I. CURTIN JR.

NEW! NEW!

NEW Cloth Screen Dust Filter

SLY DYNACLONE*

offers 5 NEW ADVANTAGES!



Varying suction — old-style filter

Uniform suction — Dynaclone

1. Eliminates mechanical shaking.
2. Provides uniform suction at dust source.
3. Assures longer bag life . . . 4. minimum maintenance.
5. Keeps itself automatically and continuously clean without additional power or equipment.

Send for descriptive bulletin just out on the new Sly Dynaclone — the ultimate in filter performance.

This revolutionary new dust filter is another Sly first. Extremely simple and thoroughly dependable, it eliminates entirely the gremlin of mechanical shaking and provides uniform suction of air at dust source.

This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

No mechanical shaking or flexing device is needed, eliminating all strain and wear on the filter bags.

The simplicity of design and operation and elimination of all auxiliary equipment for periodic cleaning of bags mean a saving of floor space and a very minimum of maintenance.

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

*Patent Applied for

SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL

THE W. W. SLY MANUFACTURING CO.
4753 Train Avenue • Cleveland 2, Ohio
NEW YORK • CHICAGO • ST. LOUIS • PHILADELPHIA
DETROIT • MINNEAPOLIS • BIRMINGHAM • CINCINNATI
LOS ANGELES • ROCHESTER • TORONTO

(*Continued from page* 106)

Buffalo for Buflovak Equipment, Division of Blaw-Knox Co., Pittsburgh.

♦ ♦ ♦

Ward Dougherty, for the past 4 years export manager of the Machine Division, Osborn Mfg. Co.,

WARD DOUGHERTY

Cleveland, has been appointed sales engineer of the division. Mr. Dougherty, who has been with the company more than 25 years, will cover a territory consisting of southwest Ohio, southern Indiana, Kentucky, Missouri and Kansas, with headquarters in Cincinnati.

♦ ♦ ♦

Guy A. Baker, formerly assistant to the president and secretary, has been appointed vice president in charge of manufacturing, the Duriron Co. Inc., Dayton, O. Mr. Baker has been active in metallurgical research and development during 20 years of association with the company. Previously he was manager of its alloy castings sales. **R. Merton Shields,** formerly manager of the company's Dayton, O., district sales, has been named secretary of the Duriron Co. A graduate of Michigan College of Mining and Technology, Mr. Shields has been with the company since 1936.

♦ ♦ ♦

J. M. Spangler, formerly director, vice president and general manager, National Carbon Division, Union Carbide & Carbon Corp., New York, has been appointed president of the division, following 35 years of service. Mr. Spangler, who joined National Carbon in 1915, assumed charge of the Chicago sales office in 1915, moving up to general sales manager 10 years later. In 1943 he became vice president in charge of sales, and a year later became vice president-general manager.

♦ ♦ ♦

Cecil E. Bales has been elected president, the Ironton Fire Brick Co., Ironton, O. Mr. Bales, who joined the company as production manager in 1926, became vice president three years later. Prior to that he was associated with Louisville Fire Brick Works, Louisville, as chemist and assistant manager. He has been active in the refractories industry for more than 30 years and is a current director of the American Refractories Institute and a member of its technical advisory committee. Mr. Bales has been president of the Ohio Ceramic Industries Association and president of the American Ceramic Society since 1922.

♦ ♦ ♦

Dr. Robert F. Mehl, Carnegie Institute of Technology, Pittsburgh, has been appointed chairman of the committee on metallurgy of the Research and Development Board, National Military Establishment. Dr. Mehl, director of Carnegie's metals research laboratory and head of its metallurgical engineering department, will investigate co-ordination of all of the metallurgical research and development undertaken by many technical agencies of the military departments.

♦ ♦ ♦

Donald S. Leonard has joined United States Graphite Co., Saginaw, Mich., as a sales representative in the territory comprising northwestern

DONALD S. LEONARD

Pennsylvania, a portion of Maryland and Virginia and West Virginia, with headquarters in Pittsburgh. Mr. Leonard was graduated from Michigan College of Mining and Technology last year, with a degree in chemical engineering.

♦ ♦ ♦

Kennedy Davidson, formerly vice president, Consolidated Iron-Steel Mfg. Co., Cleveland, has been named president, succeeding **I. T. Kahn** who has been named chairman of its board of directors. Mr. Davidson will retain his position of treasurer of the company. **R. A. Godfrey** has been elected vice president-secretary. Vice presidents appointed include **J. F. Maine; Joseph Hanks Jr.,** Taylor & Boggis Foundry Co.; and **L. S.**

(*Concluded on page* 110)

GUY A. BAKER

R. MERTON SHIELDS

J. M. SPANGLER

CECIL E. BALES

NYLON gives this New Abrasive disc-wheel *that all-important Extra*

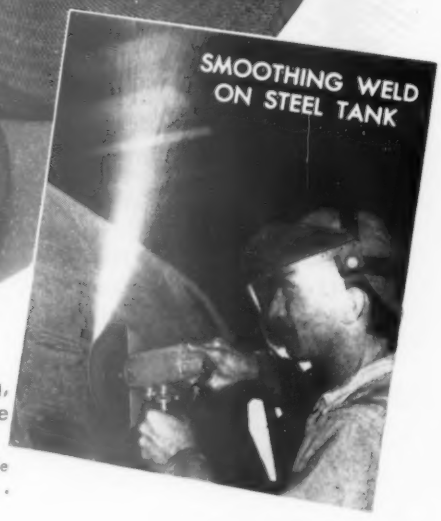
SAFE

TOUGH

DURABLE

NON-RIGID

ECONOMICAL



SAF-T-CUT

For rugged weld grinding, Saf-T-Cut disc-wheels have no superior.
(Will fit all standard right-angle head grinders and sanders . . . air or electric driven).

BAY STATE®

MEMBER OF THE GRINDING WHEEL INSTITUTE

● This unique Bay State product, reinforced with strong nylon cord, is being acclaimed the "hottest" development in the abrasive field. There are definite reasons for such valued recognition when it comes to rough, heavy-duty portable jobs that must be done *FAST*. Ask for a free demonstration. You be the judge.

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.
Chicago, Cleveland, Detroit, Pittsburgh • Distributors All Principal Cities

Top Performance Consistently Duplicated

Men OF INDUSTRY

(*Continued from page* 108)

Cawrse. R. J. Foster has been named assistant secretary and assistant treasurer, **A. Philip,** assistant treasurer and **J. Kuten,** comptroller.

♦ ♦ ♦

Elmore C. Brown has been appointed district manager of the Texas sales office recently opened in the M & M Building, Houston, by Whiting Corp., Harvey, Ill. Mr. Brown, a graduate of University of Michigan, joined Whiting 10 years ago and has spent the last 5 years as a sales engineer in the Chicago district office, specializing in foundry layout, foundry mechanization and materials handling problems. At Houston he will handle sale of foundry equipment, cranes and railroad equipment, evaporators, spray dryers and chemical plant equipment.

♦ ♦ ♦

John C. Ewer, since 1944 abrasive engineer in the Boston district, Norton Co., Worcester, Mass., has been appointed assistant general manager, Norton Grinding Wheel Co. Ltd., the company's branch plant in Welwyn Garden City, Herts, England. Mr. Ewer, who will leave for England about May 1, joined the company in 1934. He has served in the abrasive division's sales engineering department and as New England field engineer. **Raymond J. Forkey,** abrasive engineer in Rochester, N. Y., has been named to succeed Mr. Ewer in Boston.

♦ ♦ ♦

Marshall H. Jones has been elected president, Globe Iron Co., Jackson, O., succeeding his brother **Edwin A. Jones,** who was named chairman of the board of directors. **James W. Morgan** has been made vice president; **Winston Pfancuff,** assistant secretary, and **Charles P. Chapman** continues as secretary and treasurer. Marshall Jones joined the company in 1932 and served continuously except for two years when he was in the Navy. He was named vice president-general manager when he returned.

♦ ♦ ♦

William C. George has been appointed engineer in charge of a new office recently opened at 2620 Maury St., Houston, Tex., by American Brake Shoe Co., New York, to provide more direct service to its customers in Oklahoma, Texas and Louisiana. Mr. George, a graduate of Purdue University, will represent the company's American Manganese Steel, Electro-Alloys and National Bearing Divisions, in the new office. Formerly in the sales department of Electro-Alloys Division, he has been with Brake Shoe since 1939. Prior to that he was associated with Carnegie-Illinois Steel Corp., Pittsburgh.

♦ ♦ ♦

Raymond N. Outzs, who was graduated recently from Case Institute of Technology, has been appointed sand control technician and assistant to the plant metallurgist, in the Defiance, O., plant of General Motors Corp.

♦ ♦ ♦

The following executive changes have been announced by Central Foundry Division, General Motors Corp., Detroit: **Myron O. Booth,** until recently plant manager, Saginaw Malleable Iron Plant, Saginaw, Mich., has been named plant manager of the division's gray iron foundry at Defiance, O., succeeding **John Doerfner Jr.,** who has become plant engineer of the Saginaw Malleable Iron Plant. **R. Verne Righter,** divisonal personnel director, has been promoted to plant manager at Saginaw. **Herbert G. Ashbaugh** succeeds Mr. Righter, and **Robert H. Mooney,** formerly plant engineer at Saginaw Malleable, has been promoted to the Central Foundry Division's manufacturing staff.

♦ ♦ ♦

Dr. Hamnett P. Munger has been appointed by Battelle Memorial Institute, Columbus, O., to co-ordinate its air-pollution research activities and to act in a liaison capacity between the institute and industry. Dr. Munger, who has degrees from Georgia Institute of Technology, Columbia University, and University of Pittsburgh, joined the Battelle staff in 1948.

♦ ♦ ♦

Walter E. Oelschlaeger has been named manager of the By-product Coke Department, Republic Coal & Coke Co., Chicago, succeeding the late **Lewis D. McClaren.** Mr. Oelschlaeger has spent the past 16 years as Mr. McClaren's assistant and prior to joining Republic Coke was associated with Rogers, Brown & Co., Cincinnati, in the by-product coke business.

♦ ♦ ♦

E. J. Thompson has been appointed manager of the Cincinnati branch office, Claud S. Gordon Co., Chicago. Prior to joining the Gordon company Mr. Thompson was engaged in his own business as consulting metallurgical engineer.

♦ ♦ ♦

H. Walter Regensburger has been appointed chief engineer of the general engineering department, Link-Belt Co., Chicago, succeeding **Harry**

(*Concluded on page* 113)

ELMORE C. BROWN

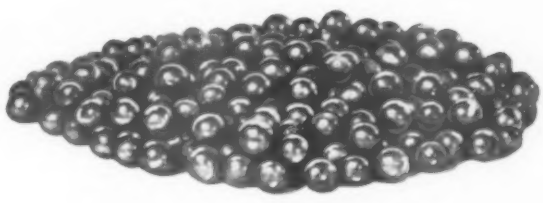
JOHN C. EWER

MARSHALL H. JONES

WILLIAM C. GEORGE

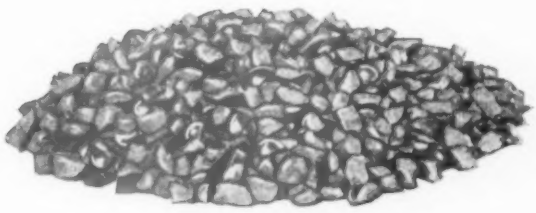
Good things come in Pairs...

Swim suits by Jantzen



METAL BLAST ANNEALSHOT

A special, exclusive annealing process makes ANNEALSHOT really tough, free of brittleness and long-lasting. It is uniformly round and solid shot—no rough edges, no "tails", no hollow shot. You'll find it does a thoroughly successful cleaning and peening job, and that it's mighty easy on equipment. A trial order will prove its efficiency.



METAL BLAST GRIT

Our second "good thing" is a product of ANNEALSHOT, and is of the same unexcelled quality. Guaranteed free of graphitic carbon, it eliminates enamel adhesion problems. Metal Blast ANNEALSHOT and GRIT are available in 11 sizes for every purpose.

METAL BLAST, INC.
872 EAST 67TH ST. CLEVELAND 3, OHIO

ANNEALSHOT by Metal Blast

TODAY'S BIG PROBLEM IN ALL FOUNDRIES...

Increased Production of Good Castings Per Man-Hour!

KNIGHT Services For Foundries:

- Foundry Engineering
- Architectural Planning
- Foundry Layout
- Foundry Modernization
- Foundry Management
- Industrial Engineering; Job Evaluation, Incentives
- Production and Cost Control

It is difficult to reduce ordinary operating costs these days, but it is possible to improve considerably the cost-production equation by greater unit production resulting in greater profit with lower operating costs and the same total production.

The solution to this problem lies in the application of improved methods, facilities and procedures for each foundry as required. There is no exact formula—each foundry must be surveyed and analyzed individually to determine the changes necessary to achieve the production improvement possible in that plant.

This is a routine job for Knight Engineers, who are familiar with the operation of hundreds of foundries—many that have had production problems similar to yours. These men, with 10 to 25 years' experience in foundry management, production, engineering or equipment, can quickly analyze your operations and make recommendations to achieve increased unit production, better quality castings and reduced scrap.

It may be that only better application or more efficient use of existing methods and facilities or a more equitable wage incentive plan is required—or it may be that a series of progressive improvements to several departments is required—but Knight Engineers will be glad to find out for you and work with you regardless of how large or small the job may be.

Call or write the Knight office in either Chicago or New York for immediate attention.

LESTER B. KNIGHT & ASSOCIATES INC.

Consulting *Engineers*

600 W. JACKSON BLVD.
CHICAGO 6, ILLINOIS

30 CHURCH STREET
NEW YORK 7, NEW YORK

CONSULTING SERVICE
for Management • Sales • Production

ENGINEERING SERVICE
for Surveys • Modernization • Mechanization

(*Concluded from page* 110)

L. Strube, who has retired. The department, formerly in Philadelphia, has been transferred to 301 West Pershing Rd., Chicago. **Charles M. Young Jr.** has been named chief developmental engineer, to assist Mr. Regensburger, and **Harold F. Watson,** chief standards engineer.

♦ ♦ ♦

R. A. Roosevelt, for the last 3 years advertising manager, **Eriez** Mfg. Co., Erie, Pa., has been appointed sales manager, succeeding **George R. Wellmon,** who has resigned. Mr. Roosevelt was formerly assistant supervisor of publicity at the Erie, Pa., works, General Electric Co., Schenectady, N. Y.

♦ ♦ ♦

Stuart M. Phelps, senior fellow, Mellon Institute, Pittsburgh, and director of research and tests, American Refractories Institute, has been chosen as recipient of the 1950 Albert Victor Bleininger Award for distinguished achievement in the field of ceramics, to be presented at a dinner at Hotel Schenley, Pittsburgh, March 10, by the American Ceramic Society.

♦ ♦ ♦

Herbert O. Jarvis, a vice president of Continental Copper & Steel Industries Inc., New York, has been elected one of its directors. Mr. Jarvis is also general manager of the Niagara Falls Smelting & Refining Division, Buffalo, N. Y.

♦ ♦ ♦

A. C. Thompson, formerly works manager of the Bartlett Hayward plant of Koppers Co. Inc., Pittsburgh, has been named production manager of the company's Metal Products Division, in charge of production, methods, incentives and service at Bartlett Hayward and the American Hammered Piston Ring plants of the division, located in Baltimore. **Nick Kay** has been appointed general superintendent of the machine shops, and **E. A. Franke,** general superintendent of the foundries, for the Metal Products Division, both reporting to Mr. Thompson.

♦ ♦ ♦

Robert C. Johnston has joined the sales force of Hickman, Williams & Co., Chicago. Following service as a fighter pilot in the 12th Air Force in Italy, he was graduated from Cornell University in 1947. During the past year he has been with Carnegie-Illinois Steel Corp., in the blast furnace department of the Gary steelworks.

♦ ♦ ♦

R. G. Fredette, formerly associated with Raytheon Mfg. Corp., Waltham, Mass., has been named production manager, Hunt-Spiller Mfg. Corp., South Boston, Mass.

BRITISH PRODUCTIVITY TEAM: Members of the group of British gray iron foundrymen who recently visited the United States are shown here at a luncheon given them by Stone-Wallwork Ltd. in London before their departure. Top left shows S. H. Russell, S. Russell & Sons Ltd., Productivity Team leader, standing between Sir Holland Goddard and F. A. G. Powell-Jones. Center group includes N. P. Newman, managing director of Newman, Hender & Co. Ltd., and president of the Institute of British Foundrymen; Vincent Delport, *The Foundry;* S. H. Russell; Sir Holland Goddard; G. B. Judd, secretary to the team; D. Drysdale, Stone-Wallwork Ltd. At right F. P. Bartlett, first secretary of the American Embassy, addresses the group

WISCONSIN REGIONAL FOUNDRY CONFERENCE

Draws Nearly 600 Participants

By EDWIN BREMER, ERLE F. ROSS and HOWARD C. TUTTLE, *THE FOUNDRY* and A. W. GREGG, Whiting Corp.

NO. 13 bore no superstitious connotation to the Wisconsin Chapter, AFS, and the University of Wisconsin, in their annual joint sponsorship of a regional foundry conference. The 1950 event, thirteenth in the series, was held at Hotel Schroeder, Milwaukee, Feb. 9-10, and it was fully as successful as previous gatherings from the point of view of attendance, interest and program quality.

Close to 600 foundrymen, metallurgists, engineers, pattern men and representatives of management, participated in 24 technical sessions devoted to foundry problems and equipment and listened to outstanding speakers at a general meeting, two luncheons and a banquet.

President of the conference was R. C. Woodward, chief metallurgist, Bucyrus-Erie Co., South Milwaukee, Wis. W. W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, was chairman; and G. E. Tisdale, secretary-treasurer, Zenith Foundry Co., West Allis, Wis., was co-chairman. Associate chairmen were Prof. E. R. Shorey and G. J. Barker, department of mining and metallurgy, college of engineering, University of Wisconsin, Madison, Wis. J. G. Risney, Risney Foundry Equipment Co., Milwaukee, was general program chairman.

Every Man a Salesman

An outstanding inspirational address, "What Kind of a Salesman Are You?" by Kenneth Haagensen, director of public relations, Allis-Chalmers Mfg. Co., Milwaukee, featured the first day's luncheon. Mr. Haagensen made a strong plea for continuation of America's free-enterprise system and emphasized that each member of his audience is a salesman for this system.

Oscar Rennebohm, governor of Wisconsin, addressed the capacity audience attending the banquet on Thursday evening. The governor focused his remarks upon state and national problems such as taxation, expenditures and necessity for budget balancing.

A humorous yet philosophical note was struck by Edward McFaul, Midwest Institute, Chicago, in addressing the second day's luncheon on the intriguing subject of "So You Think You Are Slipping."

Dean M. O. Withey, college of engineering, University of Wisconsin, Madison, Wis., presented the opening address at the conference. Directing his remarks to the question "Why Should a Professional Engineer Be Registered?" he made a convincing case for the registration of engineers whose activities concern the health, safety and welfare of people. Such registration also serves to raise the standing of engineers and the engineering profession.

AFS National President E. W. Horlebein, president, Gibson & Kirk Co., Baltimore, also addressed the opening session, and dealt with activities of the society. His appraisal of the future of the society and the industry was an optimistic one.

The 24 technical sessions consisted of four periods of six simultaneous meetings. These meetings were designated as Steel, Gray Iron, Malleable Iron, Nonferrous, Pattern and Technical. All featured a good level of discussion.

First session on nonferrous practice had A. R. Tooman, Racine Aluminum & Brass Foundry, Racine, Wis., and K. L. Jacobs, Standard Brass Works, Milwaukee, presiding. Hiram Brown, Solar Aircraft Corp., Des Moines, Iowa, in speaking on "Precision Aluminum Castings," pointed out that good metal of known composition is required if good castings are expected. In sand molding where smooth surfaces are desired, a sand of 140 to 270 AFS grain fineness number with 10 to 25 per cent clay, 5 to 8 psi green compressive strength, and 5 to 30 permeability will serve. Multiple gating is preferred as it permits a lower pouring temperature.

In permanent mold casting the gray iron mold should be given a thorough stress relief before machining. Molds should be equipped with heating or cooling systems since there is an optimum mold temperature for each casting. Operating range is from 600 to 800° F. Mr. Brown then discussed various features of die casting, plaster casting, investment molding, and centrifugal casting. He gave these tolerances for the various methods: 1/32 to 1/16-in. in sand casting; 0.010 to 0.020-in. for permanent mold; 0.002 to 0.005-in. for die casting; 0.002 to 0.005-in. for plaster molding, and 0.003 to 0.005-in. for investment casting of aluminum alloys.

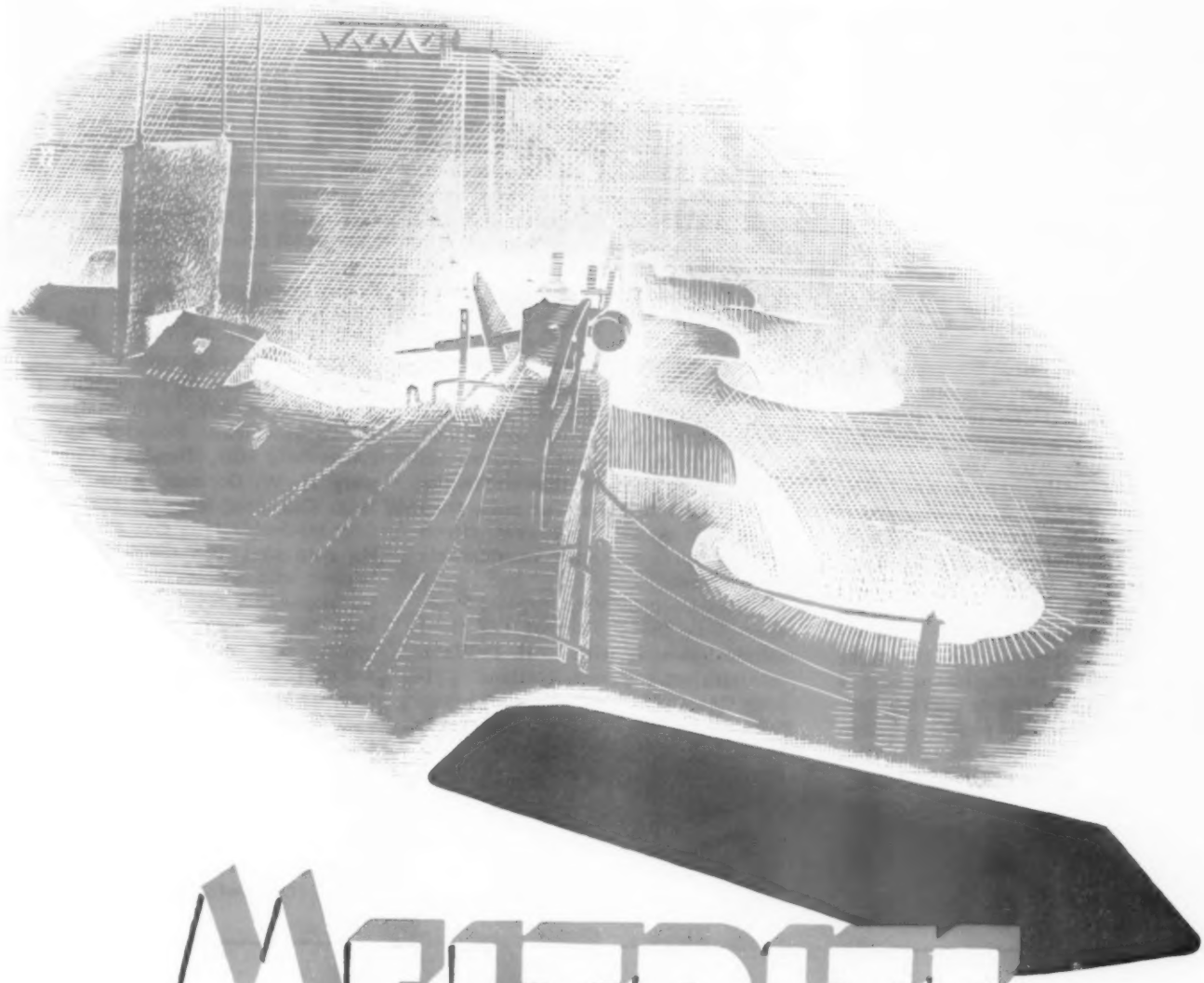
Second nonferrous session dealt with permanent molds for aluminum castings, and was under the direction of J. D. Claffey, General Malleable Corp., Waukesha, Wis., and L. T. Andres, Lawran Foundry Co., West Allis, Wis. John T. Watry, Aluminum Castings & Engineering Co., Milwaukee, the speaker, pointed out there are no hard and fast rules for designing molds since each casting must be considered on its own merits. Metal must enter the mold smoothly without turbulence, and the gating system should promote directional solidification.

Study Bronze Problems

Third nonferrous session related to bronze problem castings, with R. A. Colton, Federated Metals Division, American Smelting & Refining Co., New York, as the speaker, and C. Kotowicz, Ampco Metal Inc., Milwaukee, and D. S. Bosma, Bucyrus-Erie Co., South Milwaukee, Wis., presiding. Mr. Colton said it is difficult to produce pure copper castings due to the affinity of that metal for gases. Main offender is hydrogen which reacts with oxygen. Suggested procedure is to melt under reducing conditions using a charcoal cover, and add an agent such as lithium, boron, zinc, etc., which prevents pick-up of oxygen during pouring. It always is advisable to pour a plug before removing the metal from the furnace, and observe whether it shrinks properly, indicating freedom from gas, or does not, or mushrooms. The latter indicate gassing, and require further degassing before removing the metal from the furnace.

A repeat of last year's popular "Information Forum" concluded the nonferrous program. Panel consisted of E. W. Smith, Western Materials Co., Chicago; John Budnik, Wisconsin Aluminum Foundry Co. Inc., Manitowoc, Wis.; W. W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, and Tom Kramer, W. F. Jobbins, Inc., Aurora, Ill. Moderator was M. E. Nevins, Wisconsin Centrifugal Foundry Inc., Waukesha, Wis. Program chairman and co-chairman were, respectively, C. Van Buren, superintendent, Allis-Chalmers Mfg. Co., Milwaukee, and J. L. Kammermeyer, district manager, Milwaukee Federated Metals Division, American Smelting & Refining Co.

(*Continued on page* 116)



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IRON ORE • PIG IRON • COAL • COKE

(*Continued from page* 114)

The panel discussed problems and questions given it by the audience, and some practical ideas for the improvement of particularly troublesome nonferrous castings evolved. The comparatively new field of cement molding brought forth considerable discussion and testimony concerning its advantages. Mr. Van Buren cited three important ones: No flask cost; no core oven capacity necessary; close size control possible.

In the first technical session, E. D. Coleman, Coleman Instruments Inc., Maywood, Ill., described the "Spectrophotometer," an instrument for chemical analysis utilizing color diffraction as its operating principle. H. F. Haase, research engineer, Marquette University, Milwaukee, was chairman of this session, assisted by Walter Johnson, Crucible Steel Casting Co., Milwaukee, as co-chairman.

The device consists of a light source, a slit, a means of producing a spectrum and a method for positioning a liquid specimen in the light path. Provided on the instrument is a means for measuring the proportion of light which passes through the specimen at various wave lengths. Discussion consisted largely of technique employed in laboratory use of the equipment.

Second technical session was under the direction of Bradley H. Booth, Carpenter Brothers Inc., Milwaukee, and A. J. Popovich, Allis-Chalmers Mfg. Co., West Allis, Wis. Speaker was J. R. Lewis, Titanium Alloy Division, National Lead Co., Niagara Falls, N. Y., and his topic was zirconium sands which are used in cores which must resist high temperatures, as facings for cores and molds, and in abrasive blasting. Grains are round, and mesh size ranges from 150 down. Thermal expansion is 1/10 of 1 per cent. Zircon sands are used where protection from metal penetration is desired such as around gate areas and in cores, since they are resistant to wetting by the metal. Zircon sands require less oil for a given strength, and have a better permeability for a given mesh due to being round grained. All zircon sand is being used for thin wafer-like cores subject to high heat since they are strong, and 20 per cent zircon sand in cores provides considerable improvement.

"Gases Used in Metallurgical Processes" was the subject of the third technical session, with L. H. DeWald, metallurgical engineer, National Cylinder Gas Co., Chicago, the speaker. This all-inclusive talk, ranging in coverage from use of gases for scarfing, to oxygen enrichment in the cupola, to uses of gases in vapor plating, pointed out how effectively various gases may be used to lessen melting time or obtain results otherwise impossible. Of especial significance was his reference to oxygen additions to the electric furnace bath. A comparison between the time required to oxidize the melt in a 3-ton electric furnace through oxygen addition and through ore refining methods showed the same results could be obtained in two minutes with the former method against 30 minutes with the latter. Robert J. Cox, chemist, Ampco Metal Inc., Milwaukee, was session chairman, N. F. Koch, metallurgist, Milwaukee Steel Division, Grede Foundries Inc., Milwaukee, the co-chairman.

Final technical session was devoted to a description of permanent mold production of gray iron castings by E. C. Hoenicke, Foundry Division, Eaton Mfg. Co., Detroit. Chairmen were H. W. Gorman, Allis-Chalmers Mfg. Co., and Roy McIntosh, Belle City Malleable Iron Co., Racine, Wis. He said that the molds are hollow backed with a thickness of ¾ to 1¼ in. depending upon the amount of heat to be extracted. Additionally cooling pins on the back of the mold are spaced to dissipate heat and maintain uniform mold temperature. Gate size ranges from 0.045 to 0.0875-in. thick, and is determined by try-out and experience. In operation the molds are coated with a refractory for protective purposes. Molds also are smoked automatically with an acetylene torch before metal is

(*Concluded on page* 118)

Meetings of Interest to Foundrymen

Feb. 27-Mar. 3—American Society for Testing Materials, annual committee week, William Penn Hotel, Pittsburgh

Mar. 3—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Mar. 8—American Society for Testing Materials, district meeting, Philadelphia

Mar. 10-11—Ohio Regional Foundry Conference, Cincinnati, sponsored by Ohio AFS Chapters and University of Cincinnati.

Mar. 21-22—Steel Founders' Society of America, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 22-23—Malleable Founders' Society, market development conference, Northwestern University, Evanston, Ill.

Mar. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Mar. 29—American Society for Testing Materials, district meeting, Chicago

Apr. 4-8—Chicago Technical Societies Council, national production exposition, Stevens Hotel, Chicago

Apr. 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

May 8-12—American Foundrymen's Society, annual convention and exhibition, Public Auditorium, Cleveland

May 19—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 26—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 1-3—Electric Metal Makers Guild, annual meeting, Shawnee Hotel, Springfield, O.

June 22-23—Malleable Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

June 26-30—American Society for Testing Materials, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.

July 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Sept. 25-26—Steel Founders' Society of America, fall meeting, The Homestead, Hot Springs, Va.

Oct. 12-14—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 13-14—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Oct. 23-27—American Society for Metals, congress and exposition, International Amphitheatre, Chicago

Nov. 9-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 9-11—Steel Founders' Society of America, annual technical and operating conference, Carter Hotel, Cleveland

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(*Concluded from page* 116)

poured into all the waiting molds.

Castings are annealed to remove stresses and to provide free machinability. Temperature is 1575° F, and holding time is 25 minutes. Composition of the castings has the following range: TC 3.45 to 3.65 per cent; Si 2.45 to 2.65 per cent; Mn 0.70 to 0.90 per cent; S 0.10 per cent maximum, and P 0.35 per cent maximum.

Discussion of patterns was opened by D. I. Dobson, General Malleable Corp., Waukesha, Wis., who described practices in gating gray iron castings. Session chairmen were H. Arenson, Spring City Pattern Works, Spring City, Wis., and M. C. Frankard, Delta Mfg. Co., Milwaukee. Method employed was use of the shrink-bob close to the casting so that the mouth between the two was kept open through formation of a hot spot. The shrink bob extends below the parting line about 2¼ in. in light castings up to 5¼ in. in heavy castings. Runner from the pouring sprue enters the shrink bob at a tangent, giving a spinning action to the metal, and carrying dirt and dross to the center. Strainer gates or skim cores are used between pouring sprue and runner to provide the desired choke.

Supplies Cover Wide Field

"Modern Pattern and Foundry Supplies" was the subject selected for the second pattern session. William Kollmorgen, Kollmorgen Pattern Works, Milwaukee, was chairman, assisted by Harry Arneson, Spring City Pattern Works, Waukesha, Wis.

Using his sales kit and catalogs, Nelse J. Olson, agent, Kindt-Collins Co., Milwaukee, enumerated and in most cases displayed pattern and foundry supplies available. These included such items as glues and adhesives, coatings, pattern and flask lumber, fillets, dowels, sanding equipment, and the like. The discussion covered individual shop experience with the various materials and supplies.

A feature of this session was the showing of a sound film, "Green Harvest," a picture on lumber, through courtesy of the Weyerhauser Lumber Co. In introducing the film, George D. Mill, the company's Milwaukee representative, stated that pattern grade lumber constitutes less than 2 per cent of lumber cut; this because of the very high quality required for pattern material. Under the certified tree farming system now practiced, timber is being grown faster than it is being cut. Furthermore, under such control, it is possible to put more growth on a tree in 12 years than nature can do in 75 years alone, and quality is superior.

Pressure casting of aluminum patterns and coreboxes was the subject discussed at the third pattern session by J. Mathias, Accurate Match Plate Co., Chicago. Session was presided over by L. Gratz, G & O Pattern Works, Milwaukee, and A. Huebner, Allis-Chalmers Mfg. Co. Mr. Mathias described the various steps in making a matchplate from a single master pattern. He said brass is the best material for the master since it has a dense, smooth surface not attacked by the plaster. Wood patterns should be carefully sealed and coated; and aluminum gives better results when coated with lacquer. Shell patterns tend to warp, and are hard to withdraw from plaster without damage. Split patterns should be arranged so that they may be fastened tightly together.

Final pattern session was under the direction of A. F. Pfeiffer, Allis-Chalmers Mfg. Co., and A. M. Fischer, Charles Jurack Co., Milwaukee. L. F. Tucker, City Pattern & Foundry Co., South Bend, Ind., and national chairman of the AFS Pattern Division, discussed the national pattern program. He said the group should undertake an educational campaign to inform the foundry industry of the importance of patterns and patternmaking so that those might receive proper recognition. He also suggested that detailed information on desirable requirements be gathered and published to aid pattern buyers, and that standards for various elements in patternmaking be established. Meeting was closed with a brief description by A. F. Pfeiffer of a procedure for increasing the number of castings from molds where a flat cope or drag usually is employed. Method involves use of a thin flat core between two sets of cavities.

(*To be concluded next month*)

Many Specifications Revised by ASTM

Through numerous recommendations on standards from Committee A-1 on Steel and Committee B-2 on Nonferrous Metals and Alloys, as well as actions from other technical groups, the American Society for Testing Materials through its Administrative Committee on Standards, approved many new and revised tentatives during December, 1949. One new tentative, A 217-49T "Alloy Steel Castings for Pressure Containing Parts Suitable for High Temperature Service" is a consolidation of two existing specifications, A 217 and A 157. The new one covers nine grades of ferritic steel such as carbon-molybdenum, chromium - molybdenum, and other alloys with tensile strengths ranging from 65,000 to 95,000 psi minimum, and elongations from 15 to 24 per cent in 2 in.

For about two years Committee A-10 on Iron-chromium, Iron-chromium-nickel and Related Alloys has been working with the Alloy Casting Institute to reconcile the chemical compositions of several grades of steel covered in specifications A 296-49T "Corrosion-resistant Iron-chromium and Iron-chromium-nickel Alloy Castings for General Applications," and A 297-49T "Heat-resistant Iron-chromium and Iron-chromium-nickel Alloy Castings for General Applications," and revisions in those have resulted. In both specifications the ACI designations are being adopted as well as modified chemical requirements.

Change in specification B 94-49T "Magnesium-base Alloy Die Castings" provides for a new alloy AZ91B and a redesignation of present alloy AZ91 as AZ91A. This has more restricted chemical requirements than the new alloy. In connection with the new composition there is a supplementary note reading as follows: "The corrosion resistance of alloy AZ91B is impaired by the higher copper content, and castings made from this alloy should be used under a known range of atmospheric conditions for which their life can be considered satisfactory." A companion change in specification B 93-49T "Magnesium-base Alloys in Ingot Form for Sand Castings, Die Castings and Permanent Mold Castings" will provide basic material for the new die-casting alloy AZ91B. The "Magnesium-base Alloy Permanent Mold Castings" tentative, B 199-47T, will have the minimum tensile strength of two alloys, A10 and AZ92, increased from 32,000 to 34,000 psi.

Specifications for "Foundry Pig Iron", A 43-45T, include many grades of commercial materials available. The designations of those are being modified to incorporate American Iron and Steel Institute designations. At the same time the silvery grades of pig iron were not complete and the requirements did not represent current commercial practice, so appropriate changes have been made. Changes in the requirements for "Gray Iron Castings for Pressure-containing Parts for Temperatures up to 650° F, A 278-44T, bring them into line with certain of the requirements of the American Society of Mechanical Engineers Pressure Vessel Code.

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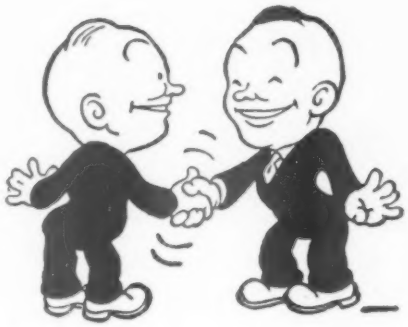

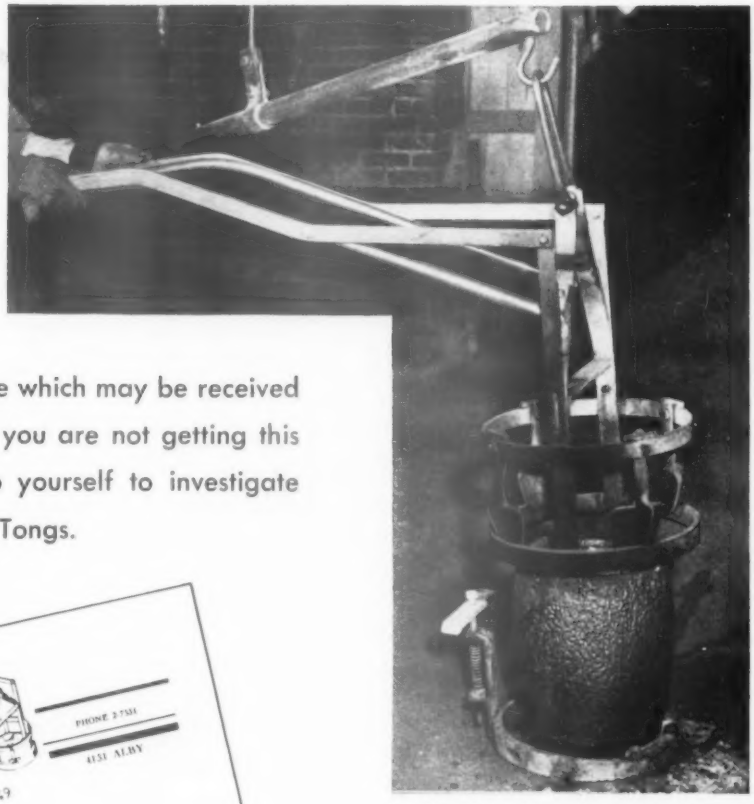

The letter below illustrates the service which may be received from Starrbide crucibles melting bronze. If you are not getting this service from your crucibles, you owe it to yourself to investigate Starrbide crucibles and Hutchinson Cradle Tongs.

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4151 ALBY

December 1, 1949

American Crucible Co.
North Haven, Conn.

Attention: Mr. Geo. T. Hubbell

Dear Mr. Hubbell:

Since writing you on September 16, we have had some additional interesting records with Starrbide crucibles. We have had one #40 showing 266 heats, and a second taken out November 23, with 195 heats. In both cases the crucibles were still usable but were getting rough around the top and a bit thin in side walls.

Mr. Francisous is taking good care of us.

Yours very truly,

O.C.K. Hutchinson:lh
cc/Mr. J. L. Francisous
St. Louis, Mo.

Loading is quick and easy as tong is dropped over the crucible. Note that cross-bar stops it at the proper height. Light-weight, sturdy construction appeals to workmen, assures trouble-free service and long life.

Four cast-steel pads supported by a heavy ring carry the crucible. (The pads automatically adjust themselves to the crucible contour.)

The crucible is released with ease as its weight is placed on the floor by merely "squeezing" the levers.

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INDUSTRY Briefs

ECLIPSE Fuel Engineering Co., Rockford, Ill., is modernizing and expanding its plant. Several company divisions have been moved into new buildings to be known as plant No 2, at Buchanan & Loomis Sts. Administrative, sales and accounting offices continue for the present at the company's South Main Street plant. A third building at 129 Morgan St. is being used exclusively for manufacturing and storage of gas meter and gas distribution accessories.

* * *

Central Castings Co., Cleveland, has been formed to represent an established manufacturing concern in sale of gray iron and aluminum castings. Incorporators are Carl W. Schaefer, 830 Leader Bldg., Cleveland, and Richard C. Schaefer and Harold C. Schlenker.

* * *

Universal Die Casting & Mfg. Corp., Saline, Mich., is spending $100,000 on plant additions. A one-story building will add 20,000 sq ft of manufacturing floor space, and a two-story building will add 2400 sq ft of space for chemical and metallurgical research.

* * *

Valley Foundry & Machine Works Inc., East Ave. & Golden State Highway, Fresno, Calif., is constructing a 60 x 120-ft building, which is scheduled for completion about the middle of March. Company then will move from its present location at 710 H St., Fresno.

* * *

Laclede-Christy Co., Ambassador Bldg., St. Louis 1, has made a long-term resale agreement with Clayburn Co., Vancouver, B. C., Canada, wherein Laclede-Christy refractories can be supplied to Pacific Northwest users from a plant at Abbotsford, B. C.

* * *

Herman Nelson Corp., 1824 Third Ave., Moline, Ill., has been merged with American Air Filter Co., 266 Central Ave., Louisville 8, and will be known as the Herman Nelson Division of American. Executive appointments for the enlarged firm are: W. G. Frank and Richard H. Nelson, directors; Richard H. Nelson and Robert W. Nelson, vice presidents, and E. G. Mason, assistant secretary-treasurer.

* * *

Mayer & Roth, 2007 Madison Rd., Cincinnati 8, have been appointed sales engineering representatives of the Aurora Metal Co., Aurora, Ill., for the sale of aluminum bronze and solicon bronze vacuum die castings in southern Ohio and southeastern Indiana.

* * *

Covel Mfg. Co., 280 North Shore Dr., Benton Harbor, Mich., has closed its foundry division after 42 years of operation. Manufacture of machine tools, the firm's main line, will continue, according to E. C. Filstrip, company president.

* * *

Ohio Electric Mfg. Co., 5900 Maurice Ave., Cleveland 4, has purchased all assets except the plant of Wright Hoist Division, Lisbon Hoist & Crane Co., Lisbon O. Hoists will be manufactured at the Ohio Electric plant in Cleveland.

* * *

J. Frankel Aluminum Corp. has moved from 570 Seventh Ave. to 18 East 41st St., New York. Robert Pohly has been appointed consultant and adviser, and Henry D. Pohly has been appointed vice president.

* * *

Doehler-Jarvis Corp., 386 Fourth Ave., New York 16, has purchased a site located in the 500 block on Oakdale St. SE, Grand Rapids, Mich., for the expansion of die casting facilities in Grand Rapids.

* * *

Cutler-Hammer Inc., Milwaukee, has opened a new sales office at 410 West First St., Dayton, O. P. L. Erickson is office manager.

* * *

United States Pipe & Foundry Co. plant at Addyston, O., has discontinued operations and has been placed on inactive status pending developments in the cast iron pressure pipe industry. Built in 1888, the plant was shut down in 1931 and reopened in 1942.

* * *

Omni-Metal Castings Inc. has been incorporated in New York to conduct a general foundry business. Directors of the company are Lyonel E. Zunz, Gertrude Foster, and Faye O. Morley, all of 41 Broad St., New York.

* * *

Mine Safety Appliances Co., Pittsburgh, has opened a new warehouse to serve Connecticut and eastern New York at 5-45 49th Ave., Long Island City, N. Y. H. J. Segrave is district manager.

* * *

Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., has appointed Briggs-Weaver Machinery Co., 300 South Wayside Dr., Houston, Tex., distributor of industrial rubber products.

* * *

York Foundry & Engine Works Inc., 912 Grant Ave., York, Nebr., has leased its casting department to Art P. Clifford Jr., who will make all of the castings for York as well as do jobbing work.

* * *

The former West Allis Gray Iron Foundry Co., 5116 West Lincoln Ave., West Allis, Wis., has changed its name to Pewaukee Pipe Foundry Co., and now is located in Pewaukee, Wis.

* * *

Anstice Co., 111 Humboldt St., Rochester 9, N. Y., has expanded its facilities to include die casting and permanent mold casting. Arthur J. Volles is manager of the new division.

* * *

Federal Foundry Supply Co., Cleveland, has moved its Wisconsin office to 424 East Wells St., Milwaukee 2. E. C. Meagher continues as district representative.

* * *

Sawyer Foundry & Machine Works, 244 West Seneca St., Oswego, N. Y., has been sold to Albert, Ray and Melvin Hanson of Munising, Mich.

* * *

Link-Belt Co., Chicago, has opened a factory branch store and warehouse at 2630 Holmes St., Kansas City, Mo.

* * *

Anniston Foundry Co., McDaniel St., Anniston, Ala., plans a $250,000 expansion program.

with UNIVERSAL flask pins, bushings and closing pins

No sighting is necessary to get perfect cope and drag alignment when you use Universal Flask Pins, Bushings and Closing Pins. No time is wasted. Lifting and setting *in one smooth operation* does the job with Cope Pins quickly guided to Drag Pins over tapered loose-fitting Closing Pins which are quickly removed without effort. The Elongated Flask Bushing is specially designed to permit longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Available for immediate delivery in standard sizes—special sizes and types to order. Direct your inquiries and orders to the office nearest you—1060 Broad St., Newark, N.J., and 5035 Sixth Ave., Kenosha, Wisconsin—or write to our home office.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

FOUNDRYMEN MEET AT BIRMINGHAM

For 18th Annual Conference

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

WITH another interesting program and the group's customary hospitality, the Birmingham District Chapter of the American Foundrymen's Society played host to more than 400 foundrymen at its recent Foundry Practice Conference. The meeting, held at the Tutwiler Hotel, Birmingham, Feb. 2-3, was the 18th of the oldest series of regional gatherings to be sponsored by any AFS chapter.

Last month's conference attracted registrants from 15 states, although participants from Alabama, Tennessee and Georgia predominated. Foreign countries were represented by four visitors from Mexico and one from Egypt; the latter was B. Armenian, a Cairo foundry operator.

The program, arranged by a committee headed by Morris L. Hawkins, Stockham Valves & Fittings, included five technical sessions, plant visitations, a luncheon and a banquet. Mr. Hawkins presided at the luncheon at which Edwin W. Horlebein, AFS national president and president of Gibson & Kirk Co., Baltimore, was featured speaker. Mr. Horlebein pointed to the parallel progress in technical developments of the foundry industry and in activities of the society, and referred to the benefits to be derived from free interchange of ideas in foundry group meetings.

William W. Maloney, national secretary-treasurer, also addressed the luncheon meeting, discussing the research programs and other society affairs. He indicated the AFS plans to engage in a strong safety and hygiene program.

More than 20 plants of the district were opened to visitors for inspection during one morning of the conference. Visitations were organized by a committee under the direction of Ray Frings, Harry G. Mouat Co., and Joe T. Gilbert, Stockham Valves & Fittings.

On the lighter side was an evening of entertainment arranged by a committee composed of E. A. Brandler, chairman, assisted by C. K. Donoho, R. W. Sandelin, E. M. Whelchel and W. Guy Bagley.

An interesting report on European foundries was given at the opening technical session by A. W. Gregg, Whiting Corp., Harvey, Ill. (See "A Foundryman Abroad," THE FOUNDRY, January, 1950.) Mr. Gregg, who was official AFS delegate to the International Foundry Congress in Holland last summer, said that European foundries show no lack in technical skill but do not have the mechanical facilities to match American productivity. Lack of dollars usually prevents them from acquiring the American equipment they would like to have. T. H. Benners Jr., T. H. Benners & Co., was chairman of this session.

James A. Bowers, American Cast Iron Pipe Co., presided at the second session. Discussing cupola operation, Lyle L. Clark, Buick Motor Division, Flint, Mich., said that labor is not the only cost item to be watched. For instance, if the coke ra :o of a cupola melting 100 tons a day drops

Top panel: *Left*—O. J. Myers, Werner G. Smith Co.; E. W. Horlebein, national AFS president; L. L. Clark, Buick Motor Division; B. Armenian, Cairo, Egypt. *Center*—Committee Chairman Don Abbott (membership), E. A. Brandler (entertainment), Ray Frings (plant visitation), M. L. Carl (registration). *Right*—Dr. J. T. MacKenzie, American Cast Iron Pipe Co., chats with L. L. Clark, one of the conference speakers

Bottom panel: *Left*—W. W. Maloney, national AFS secretary-treasurer, E. W. Horlebein, and L. N. Shannon, Stockham Pipe & Fittings. *Center*—Joe Woodward, banquet toastmaster, with Chapter Chairman C. P. Caldwell; Karl Landgrebe Jr., Wheland Co., E. W. Horlebein and L. N. Shannon. *Right*—Warren Jeffries, University of Alabama, and S. D. Moxley, American Cast Iron Pipe Co.

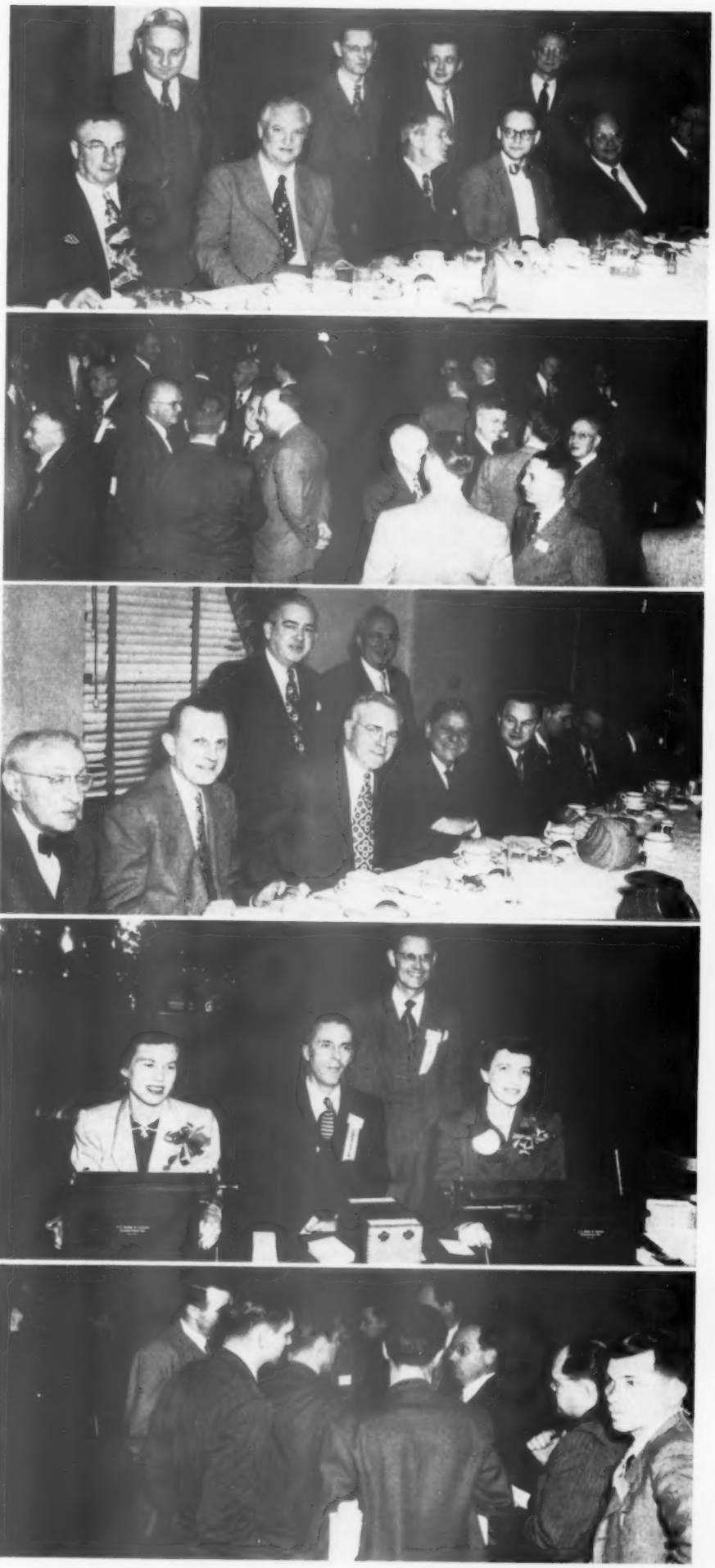
from 10-1 to 9-1, the additional cost is practically equivalent to that of adding four men to the payroll.

Similarly, a 10 per cent loss in silicon costs more than the wages of one man. Charging clean scrap with resultant reduction in slag also can produce sizable savings, he stated.

A comprehensive review of various factors involved in an effective sand control program was presented at the third technical session by Harry W. Dietert, Detroit. W. E. Jones, Stockham Valves & Fittings, was session chairman. Mr. Dietert said that improved casting quality and lower costs are possible through sand control. He recommended study of various sand properties as they affect: Ease of molding, mold condition, ease of coremaking, core condition, casting appeal, casting quality and casting cost. Specific values were given for optimum properties to obtain best results.

O. Jay Myers, foundry research director, Werner G. Smith Co., Minneapolis, was the fourth session speaker, with F. C. Coupland, American Cast Iron Pipe Co., chairman. Mr. Myers described work being conducted at the company laboratory in correlating test results with foundry applications, as well as pure research in core binders. In addition to recommendations for core sand mixes, the speaker discussed the comparative properties of core oil and dry binders for core sand use.

L. N. Shannon, vice president, Stockham Valves & Fittings, and a past national president of the AFS, presided at the concluding technical session, devoted to the Foundry Educational Foundation program at the University of Alabama. Mr. Shannon referred to the excellent foundry facilities recently completed at the university, and praised the efforts of the group of foundrymen and foundry equipment manufacturers, headed by S. D. Moxley, American Cast Iron Pipe Co., in equipping what is said to be the finest university foundry in the country. (For details



Scenes at the Birmingham Foundry Practice Conference. First and third panels from the top are views at the chapter chairman's dinner preceding the opening of the conference. Second panel shows some of the conference participants between sessions. At the registration desk in the fourth panel are W. K. Bach and M. L. Carl. Bottom panel shows Harry W. Dietert, conference speaker, in informal discussion after his talk

see page 132.)

George K. Dreher, executive director, Foundry Educational Foundation, Cleveland, discussed various activities of the organization, including its expanded program to add five more schools to the group of seven currently providing specialized foundry training to engineering students. Prof. E. C. Wright, Department of Engineering University of Alabama, outlined the foundry work being taught at that school. He praised the effectiveness of the method employed in selecting students for FEF scholarships, pointing out that the careful screening of candidates reduces the mortality which otherwise would be experienced. Prof. Wright emphasized that it is up to industry to provide summer and permanent employment for the students being trained.

C. P. Caldwell, Caldwell Foundry & Machine Co., and chairman of Birmingham District Chapter, presided at the banquet concluding the conference. Joe Woodward, Woodward Iron Co., served as toastmaster. Guest speaker was Dr. Ralph B. Draughon, president, Alabama Polytechnic Institute, whose address on "Pattern for Living" stressed the need for development of human relations as well as technology. "The tremendous rate of speed in scientific developments and industrial technology is good if men throughout the world can adjust themselves to these changes," he said.

MALLEABLE FOUNDERS MEET

For Semiannual Session

PROGRESS reports on a number of the Malleable Founders' Society's many activities were presented to nearly one hundred representatives of member companies who attended the organization's semiannual meeting at Cleveland, Jan. 20. James E. Smith, Central Foundry Division, General Motors Corp., Saginaw, Mich., and president of the society, presided.

The subject of nodular iron was discussed at the opening session under the chairmanship of George E. Bean, Wilmington Malleable Iron Works, Wilmington, Del. A report on the society's research project on nodular iron was presented by Dr. W. H. Austin Jr., who is directing this work at the Southern Research Institute, Birmingham. Additional details were furnished by Leon J. Wise, Chicago Malleable Castings Co., chairman of the society's steering committee on the project, and by James H. Lansing, technical and research director of the society. While the properties of nodular iron place it in a competitive position with malleable iron, applications of the product indicate that strongest competition will develop in castings of heavier sections. For castings having relatively thin sections malleable iron apparently retains an advantage.

Lowell D. Ryan, managing director of the society, presented statistics covering both the safety record of the malleable industry and the 1949 distribution of malleable iron castings among various consuming industries.

Featuring the report of the Market Development Committee presented by W. J. MacNeill, G. H. R. Division, Dayton Malleable Iron Co., Dayton, O., was the announcement of the scheduling of a two-day Market Development Conference to be held at Northwestern Technological Institute, Evanston, Ill., Mar. 22-23. (See page 231 for details.) It was also announced that the society will issue a new *Engineering Sales Data Book*.

Discussing industrial pension plans, Alva Z. Allen and D. Miley Phipps, Vernon Kroehle & Associates, Cleveland, recommended: 1. Avoid a national pattern in setting up an individual company plan. 2. Make the plan fit your own particular situation, one that is adapted to conditions in the particular community. 3. Seek advice from a source qualified in group insurance matters. 4. Be prepared for future renegotiation of any plan established. 5. Don't assume your plan should necessarily be the same as that of a comparable company. 6. Go slow; study carefully, and keep your plan flexible.

Collins Carter, Albion Malleable Iron Co., Albion, Mich., spoke briefly on the activities of the malleable industry subcommittee of the Foundry Industry Advisory Committee to the Munitions Board.

Industrial production in 1950 probably will vary little more than 5 per cent from the 1949 level of 175, as measured by the Federal Reserve Board index. This was the prediction of David C. Elliott, Cleveland Trust Co., speaking at the luncheon session concluding the meeting. Deferred demand caused by the late-1949 steel strike will help business early in 1950, as will also the insurance refunds to veterans. As usual, the durable goods industries, especially automotive, building construction and steel, will hold the key to industrial activity later in the year, he said.

Nominees for AFS Awards Named

Board of Awards of the American Foundrymen's Society has announced that Clarence H. Lorig, Battelle Memorial Institute, Columbus, O., has been chosen to receive the Joseph S. Seaman gold medal. Second 1950 gold medalist is Dr. Richard Schneidewind, University of Michigan, Ann Arbor, Mich., who has been named the recipient of the William H. McFadden gold medal. In addition to the two gold medals, three honorary life memberships also will be presented during the 1950 annual AFS convention and exhibition in Cleveland, May 8 to 12.

Clyde L. Frear, U. S. Navy, Bureau of Ships, Washington, D. C. and Ralph L. Lee, General Motors Corp., Detroit, are to receive honorary memberships in the society as is Edwin W. Horlebein, Gibson & Kirk Co., Baltimore, upon completion of his term as president.

In being awarded the Seaman gold medal, Dr. Lorig is being recognized "for his many contributions to foundry metallurgy and for his constant stimulation of research in the cast metals field." Dr. Schneidewind is being honored "for his valuable contributions to the malleable iron industry in connection with the graphitization of white cast iron and for his many contributions to the society and the metal castings industry."

The AFS is honoring Mr. Frear "for his long-time contributions to the society and for his work in coordinating the casting processes with Naval requirements." Well known in the foundry industry for his talks before foundry groups and his monthly contributions to THE FOUNDRY, Mr. Lee's citation is "for his philosophical approach to the problems of the foundry industry and for his stimulation of pride of craftsmanship among foundrymen."

Greek Team Visits Hunt-Spiller

An apprenticeship-in-operation case study was afforded the Greek team of engineers and mechanics, on a recent tour of the foundry of Hunt-Spiller Mfg. Corp., Boston. The six-man team, representing Greek industry, labor and government, viewed demonstrations of molding and coremaking skills of foundry apprentices at the South Boston plant, and observed production of iron and steel castings.

Highest Quality Steels
MADE WITH VANCORAM FERRO VANADIUM

The high quality of Vancoram Ferro Vanadium, consistent from lot to lot, assures the steelmaker closer control during production and a finished product of unexcelled microstructure and physical properties. The alloy is produced in the following grades to meet the requirements of various products and manufacturing technics:

	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

Large stocks are carried of all grades of alloys, and they can be supplied in any of the standard lump, crushed, or mesh sizes.

Our metallurgists will be glad to assist you in the application of Vancoram Ferro Vanadium to meet your specific requirements.

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OBITUARY

CHARLES S. McMATH, 72, veteran foundryman and former foundry supply representative, died Dec. 30. Forced into retirement by ill health, Mr. McMath had returned to his early home near New Kensington, Pa., 3½ years ago. Born near Logans Ferry, Pa., he was first associated with American Radiator & Standard Sanitary Corp., Pittsburgh, where he became night foundry superintendent. After 7 years he was

CHARLES S. McMATH

transferred to its Toronto, Ont., plant as superintendent of the bathtub foundry, leaving 2½ years later to become assistant foundry superintendent, L. Wolff Mfg. Co., Chicago. In 1918 Mr. McMath joined the Herman Pneumatic Machine Co., Pittsburgh, where he remained as service engineer for about 25 years. Later he was associated with the Willsea Works, Rochester, N. Y., and helped introduce its core oven heater. In addition he represented the E. J. Woodison Co., Detroit, handling foundry supplies. During the recent war he worked with Army engineers in the Rochester, N. Y., area.

* * *

Dr. Fritz W. Meyer, formerly associated with several American foundries and a foundry consultant and metallurgist in Chicago, during residence in United States, died Nov. 21, at his home in Winterthur, Switzerland. After receiving a doctor's degree in engineering at Aachen, Germany, in 1926, Dr. Meyer became associated with American Radiator Co., at the Ypsilanti, Mich., and Springfield, Ill., plants. Prior to returning to his home in Switzerland in 1934, he also was employed at National Radiator Co., Johnstown, Pa., Fairbanks-Morse & Co., Beloit, Wis., and Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. On his return to Switzerland he became associated with Sulzer Bros., Wintherthur, where his father was managing director, and was put in charge of all of its foundries in 1936. Dr. Meyer was a director of the Swiss Foundry Association.

* * *

Paul R. Ramp, 71, died at Stratford, Conn., Jan. 31. He was the descendant of a long line of foundrymen prominently connected with the foundry industry in England and the United States for over 200 years. After learning the trade under his father, Mr. Ramp became foundry foreman at age 21. Since that time he has had charge of many shops and has had a wider and more varied experience than falls to the lot of most men.

* * *

J. Ralph Turner, manager, Queen City Sand & Supply Co., Buffalo, died there unexpectedly, Feb. 4. Well known in the foundry industry of the area, he served as secretary of the Western New York Chapter of the AFS from 1943 to 1945. Mr. Turner joined the Queen City company in 1923, going to Buffalo from his home in Peterboro, Ont., and had been manager for many years.

* * *

Howard J. Trout, 44, personnel director, Lukfin Foundry & Machine Co., Lufkin, Tex., died Jan. 13. A native of Lufkin, Mr. Trout was a brother of Walter W. Trout and E. P. Trout, president and vice president, respectively of the Lufkin Foundry & Machine Co.

* * *

George F. Hocker, manager of sales of forgings and castings, Bethlehem Steel Co., Bethlehem, Pa., died Jan. 10. During the war Mr. Hocker was chief of the Forgings and Castings Branch, Steel Division, War Production Board, Washington.

* * *

Albert F. Paustian, 83, chairman of the board of directors, Brillion Iron Works Inc., Brillion, Wis., died Jan. 1. Mr. Paustian had been an officer of the company since 1933.

* * *

Frederic A. Schaff, 65, chairman, Combustion Engineering-Superheater Inc., New York, died Feb. 7, at his home in Bronxville, N. Y., following a long illness.

* * *

Alan E. Ashcraft, 68, until his retirement in 1946 a director and vice president in charge of manufacturing, Fairbanks, Morse & Co., Chicago, died Jan. 23, at his home in Kenilworth, Ill. Following graduation from Cornell University, Mr. Ashcraft joined Fairbanks Morse as a student trainee at the Beloit Works in 1903, where he subsequently was works manager from 1932 to 1936. In the latter year he was transferred to Chicago as vice president in charge of manufacturing.

* * *

James F. McKeone, 61, since 1944 superintendent of the steel foundry, Vulcan Iron Works, Wilkes-Barre, Pa., died Jan. 24, following a brief illness. Mr. McKeone was well known in the steel casting industry and had been superintendent of the Strong

JAMES F. McKEONE

Steel Foundry Co., Buffalo, for 18 years, prior to joining Vulcan Iron Works.

* * *

Charles Schneider, 68, for the past 12 years superintendent, Brisk Foundry & Machine Co., Imlay City, Mich., died Jan. 7. Mr. Schneider previously had been associated with Bohn Aluminum & Brass Corp., Detroit, for 19 years.

* * *

Lewis D. McClaren, 61, for 16 years manager of the By-product Coke Department, Republic Coal & Coke Co., Chicago, died Jan. 17. Mr. McClaren was a member of the American Coke & Coal Chemical Institute and the American Foundrymen's Society.

* * *

Frank McNellis, 69, since 1914 president, Imperial Brass Mfg. Co., Chicago, died Jan. 16. Mr. McNellis and his father founded the company in 1905.

* * *

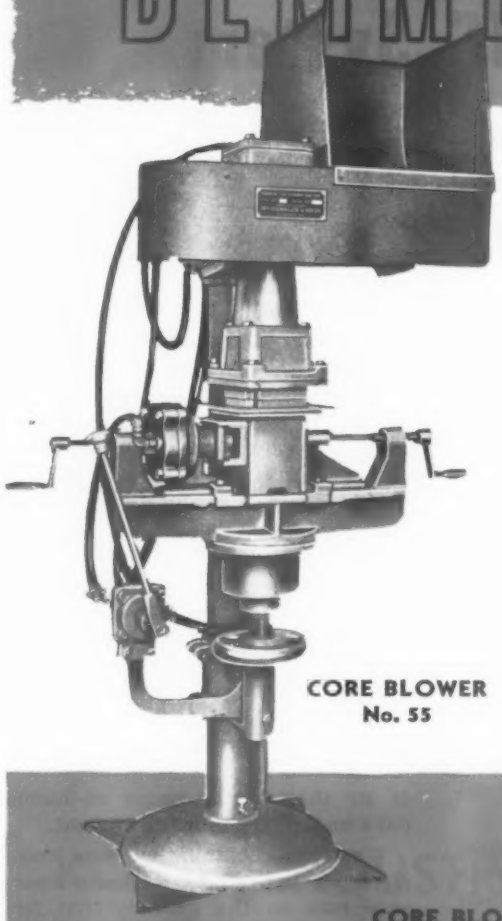
Alfred M. Fulton, vice president, Northern Malleable Iron Co., St. Paul, and a national director of the AFS, died Feb. 15.

* * *

William E. Fice, 56, sales manager, Pease Foundry Co., Toronto, Ont., Canada, died Jan. 16.

DEMMLER

HIGH PRODUCTION WITH *Maximum Economy!*



CORE BLOWER
No. 55

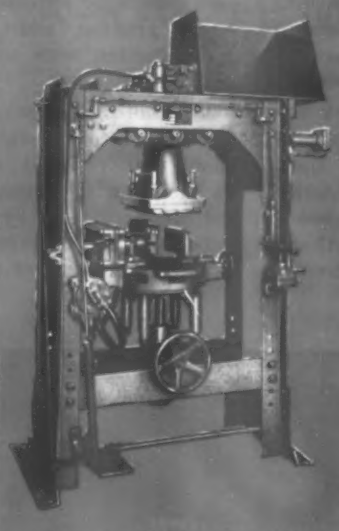
DEMMLER CORE BLOWING MACHINES

High production . . . maximum economy!

Every foundryman realizes the absolute necessity for both in these days of ever increasing production costs, and that's where DEMMLER Core Blowing Machines fit into your picture! DEMMLER machines are dependable, rugged, versatile, producing economically day after day — year after year.

At the left is the popular DEMMLER No. 55, a small core blower unequaled for blowing cores up to four pounds. Will accommodate boxes 9" long. Sand magazine and carriage are aluminum castings, mounted on ball bearing rollers for easy pushing from filling to blowing position. Machine has both vertical and horizontal air operated core box clamps, controlled automatically by the same valve that blows the core. Ideal for short run jobs. Simple in construction . . . simple in operation, the DEMMLER No. 55 has earned the praise of foundrymen everywhere.

CORE BLOWER No. 1



Well known and liked by foundrymen is the DEMMLER No. 1, at left. This is a general purpose machine for blowing cores weighing up to eight pounds, such as plumbing goods, electrical fittings up to 1½", and various small brass, malleable and grey iron castings. The No. 1 possesses quick job changing features. Chuck table is raised and lowered by a hand wheel. Chuck jaws are easily adjusted for different core box widths. Will blow either horizontal or vertical. Different size sand magazines available. Capacity: approx. 200 core boxes per hour. Many have been in continuous, profitable use for more than 25 years with only minor repairs!

CORE BLOWER No. 3E

The DEMMLER No. 3E core blower, at left, has gained an enviable reputation as a highly efficient machine for use on large cores which can be blown to advantage by attaching the top half of the core box to the blow plate and drawing the core on the machine.

An important feature of this machine is that the table height is adjustable by means of the large nut on the base, so that only as much draw is used as required.

The No. 3E is outstanding for automobile work and similar castings. The cylinder has a long center guide stem which slides in a sleeve, to insure a draw of extreme accuracy. Two hand valves operate the machine — one moves the carriage from filling to blowing position, the other raises the table, blows and draws the core. Time cycle is about 12 seconds.

Draw cylinder is 17 inches in diameter, has 10 inch stroke. Will blow cores weighing up to 35 lbs. Here is a large capacity, high production core blower with draw cylinder feature that is unexcelled in its field.

There is a DEMMLER Core Blower to meet every requirement. Let us help you with your particular needs. Illustrated specification sheets on any of the three Core Blowers will be sent upon request.

Wm. DEMMLER & BROS.
KEWANEE, ILLINOIS

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

Forced AIR HEATING System

Improves Working Conditions

By C. A. SLEICHER
President
Seaboard Foundry Inc.
Providence, R. I.

FOUNDRY operation is a business in which heat has become a matter of successful employee relations as much as a matter of providing adequate temperatures for work.

Gone are the days when scattered salamanders were considered sufficient to provide warmth for foundrymen. Workers expect comfort on the job these days, and if they don't get it, many of them, particularly the most skilled, will look elsewhere. At Seaboard Foundry, we found that forced air heat was actually an investment that paid off in efficiency and improved employee relations. A reduction in our insurance rate was a pleasant and unexpected result of our choice.

Our main foundry building is 170 feet long and 80 feet wide. Across the rear of this building the side of the letter "H" the building is about 160 x 45 feet; at the opposite end are two wings which run off the main foundry.

Our first thought was to provide steam heat. This traditional method promised excellent results in temperatures, but there would be no activity in the handling of heated air. We then investigated direct-fired forced circulation space heaters, on the theory that the more vigorous circulation of air would be beneficial to men at work, in view of the amount of oxygen they absorb.

Influenced by this consideration, we decided on an installation of five Thermobloc heaters, which had the advantage of taking air from the floor level, where cool air naturally settles, heating it, and then distributing it to a point above head level, forming a very desirable arc of circulation.

Our decision in favor of these heaters was easier to support when we found that the units and their installation would cost only about $7500, against about $20,000 for the boiler and distributing system required for a suitable steam installation. The five units, each with capacity of 550,000 Btu per hour, are completely automatic, hence give us a further economy by eliminating the need for an attendant on each eight-hour shift.

In placing the heaters, we put two in the 170 x 80-foot building, one at about one-third the distance from each end. We placed one in the 165 x 45-foot end section and one in each of the two wings. These five units are our only heating system.

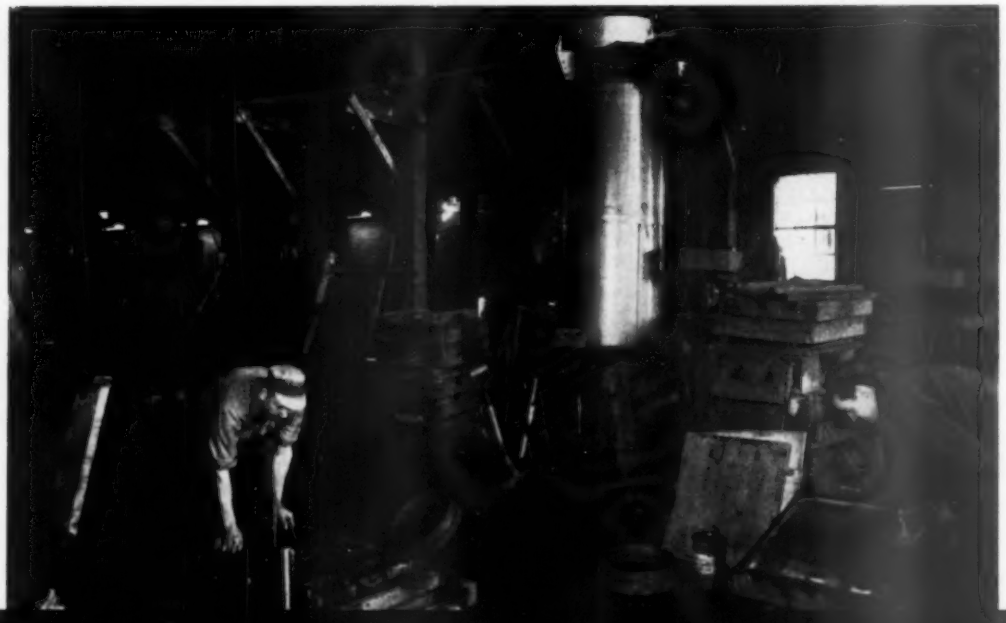
These units have been in use all through one winter season, and their performance is quite satisfactory. Overall efficiency of 85 per cent has been maintained.

With the advent of warm weather, we shut off the burners and allowed the fans to run. This gives a flow of air through the shops on humid days and offers relief from heat.

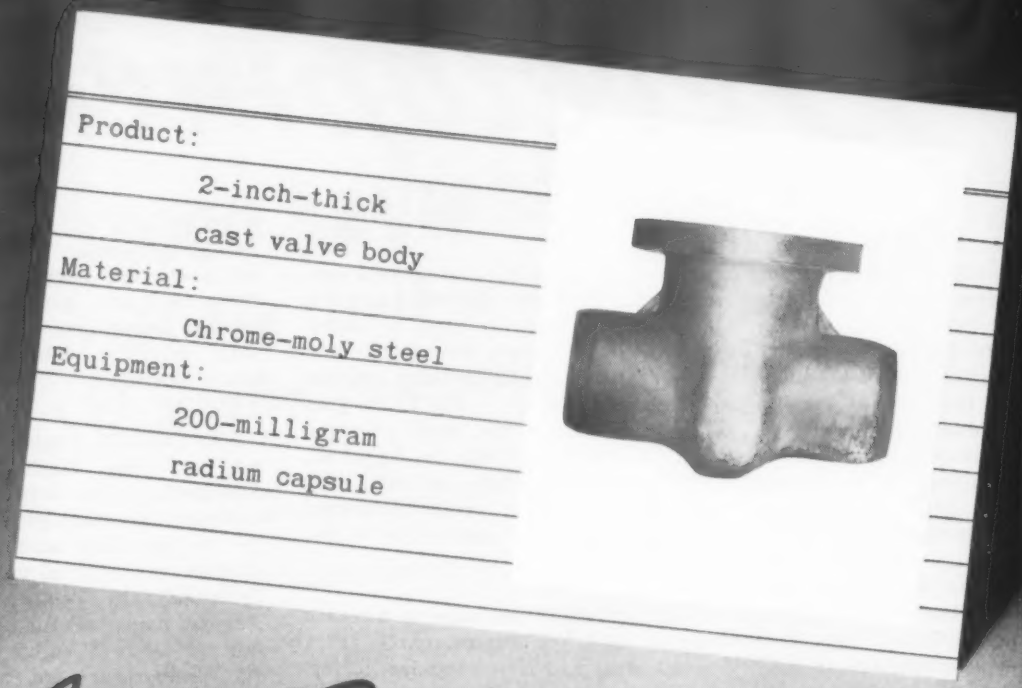
When the installation was complete, we applied for a lower insurance rate on the grounds that fire hazard had been appreciably reduced. A lower rate was granted, adding further to our satisfaction with our investment.

Now that a full cycle of operation has been experienced, we feel pleased with the decision that resulted in considerable economy, and yet gave us a heating and air circulating system that is well suited to foundry requirements, winter and summer.

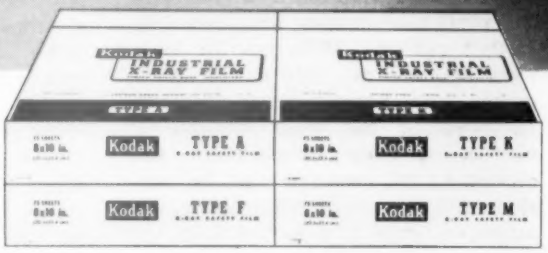
Left—One of the five direct-fired unit heaters installed in the foundry of Seaboard Foundry Inc., Providence, R. I. C. A. Sleicher Jr., son of the company's president, stands beside the unit. *Right*—In the molding department high ceilings make it unnecessary to provide a flue outlet from the heater through the roof



WHAT'S THE RIGHT X-RAY FILM?



ANSWER:

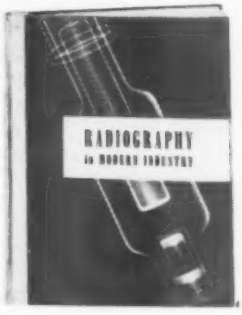


KODAK INDUSTRIAL X-RAY FILM, TYPE K

This 20-inch valve body with its 2-inch-thick walls was radiographed with Kodak Industrial X-ray Film, Type K.

The radiographer chose this type because it has high speed to do heavy jobs like this with the shortest possible exposure time. In this case, exposure of only 30 minutes was sufficient.

With all its high speed, this film provides good radiographic quality to make sure that no significant imperfections in the casting will be missed.



RADIOGRAPHY IN MODERN INDUSTRY

A wealth of invaluable data on radiographic principles, practices, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get your copy from your local x-ray dealer—price $3.

A TYPE OF FILM FOR EVERY PROBLEM

To provide the recording medium best suited to any combination of radiographic factors, Kodak produces four types of industrial x-ray film.

* * *

Type K has medium contrast with high speed. For gamma rays and for x-ray work where highest possible speed is needed at available kilovoltage without calcium tungstate screens.

Type F provides the highest available speed and contrast when exposed to x-rays with calcium tungstate intensifying screens. Has wide latitude with either x-rays or gamma rays, exposed directly or with lead foil screens.

Type M provides maximum radiographic sensitivity, high contrast, and exceptional detail under direct exposure or with lead foil screens. It has extra fine grain, and the speed is adequate for examination of light alloys at average kilovoltage and for much million-volt radiography.

Type A offers high contrast with about three times the speed of Type M but with slightly more graininess. Used direct or with lead foil screens for study of light alloys at low voltages, and of heavy steel parts with 1000-kv x-rays or gamma rays.

EASTMAN KODAK COMPANY
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"Kodak" is a trade-mark.

Radiography

...another important function of photography

Kodak

By EDWIN BREMER

FOUNDRY Developments

CONSIDERABLE improvement in the pressure-tightness of poorly fed castings in lead-free gun-metals of the 88-10-2 and 88-8-4 copper-tin-zinc type can be obtained by insuring the presence of certain amounts of residual phosphorus in the metal after deoxidation, according to W. H. Glaisher in an article in the December, 1949 issue of the *Journal* of the Institute of Metals (London). Effect is due to a reaction between the phosphorus-containing alloys and the moisture present in sand molds. This results in a more favorable distribution of unsoundness than that occurring in degassed alloys. Suitable P contents in the particular casting are from 0.04 to 0.08 per cent. With pouring temperatures below 1140°C (2084°F) rather more phosphorus is required. In selecting the most suitable P content, pouring temperature and section of the castings must be considered. For a given pouring temperature castings of heavy section are likely to require less P than castings of thin section. Metal must be free of gas before pouring and the most satisfactory method is to charge manganese ore with the metal at the start of melting.

* * *

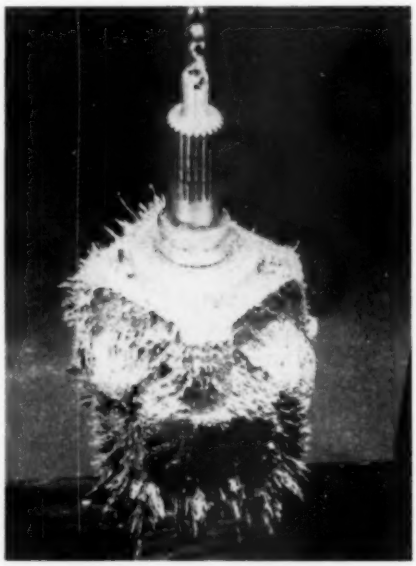
SCIENTISTS often have been accused of drawing things out of the hat, but definitely they do it with mirrors, according to a recent description of a new x-ray microscope developed by General Electric Co. Mirrors are platium-coated slabs of fused quartz which are curved by mechanical pressure. X-rays from the tube pass through the specimen and strike the mirrors at an angle of less than one-half degree. The mirrors acting like a convex lens with a light beam, bend the rays in such a manner as to form a magnified x-ray image of the sample on a photographic film located about a foot away.

* * *

SPECIAL reduction-of-area gage developed by G. W. Geil and N. L. Carwile, National Bureau of Standards, provides with a much higher degree of reliability the essential data for determining some of the mechanical properties of metals and alloys at low temperatures. Designed especially for use in tests of metal specimens completely submerged in a temperature-controlled bath ranging from minus 196 C (−321°F) to plus 100° C (212°F) the gage provides measurements accurate to 0.0001-in. It consists essentially of one sliding and two fixed anvils connected through a lever mechanism to a dial gage.

* * *

TO PREVENT damage to aircraft engine and jet engine parts from small steel and iron particles during the soft grit blasting process, the Norfolk Naval Air Station developed a simple method for removal of the latter. Solution was to suspend several magnets from salvaged aircraft engine magnetos in the blasting machine storage hopper so that grit material will fall on the magnets as it drops from the conveyor lift. Installation of the magnets reduced damage to engine parts, produced savings in man-hours necessary to clean the storage bins and replace the grit, and lowered replacement cost of corn cob and rice hull grit. Since installation of magnets the machines have been operated for two months without clean-out, saving an estimated 286 man-hours. Accompanying illustration shows one of the magnets with salvaged material after 40-hours' operation.



Permanent magnet removes ferrous particles from abrasive blasting material. Official U. S. Navy photograph

* * *

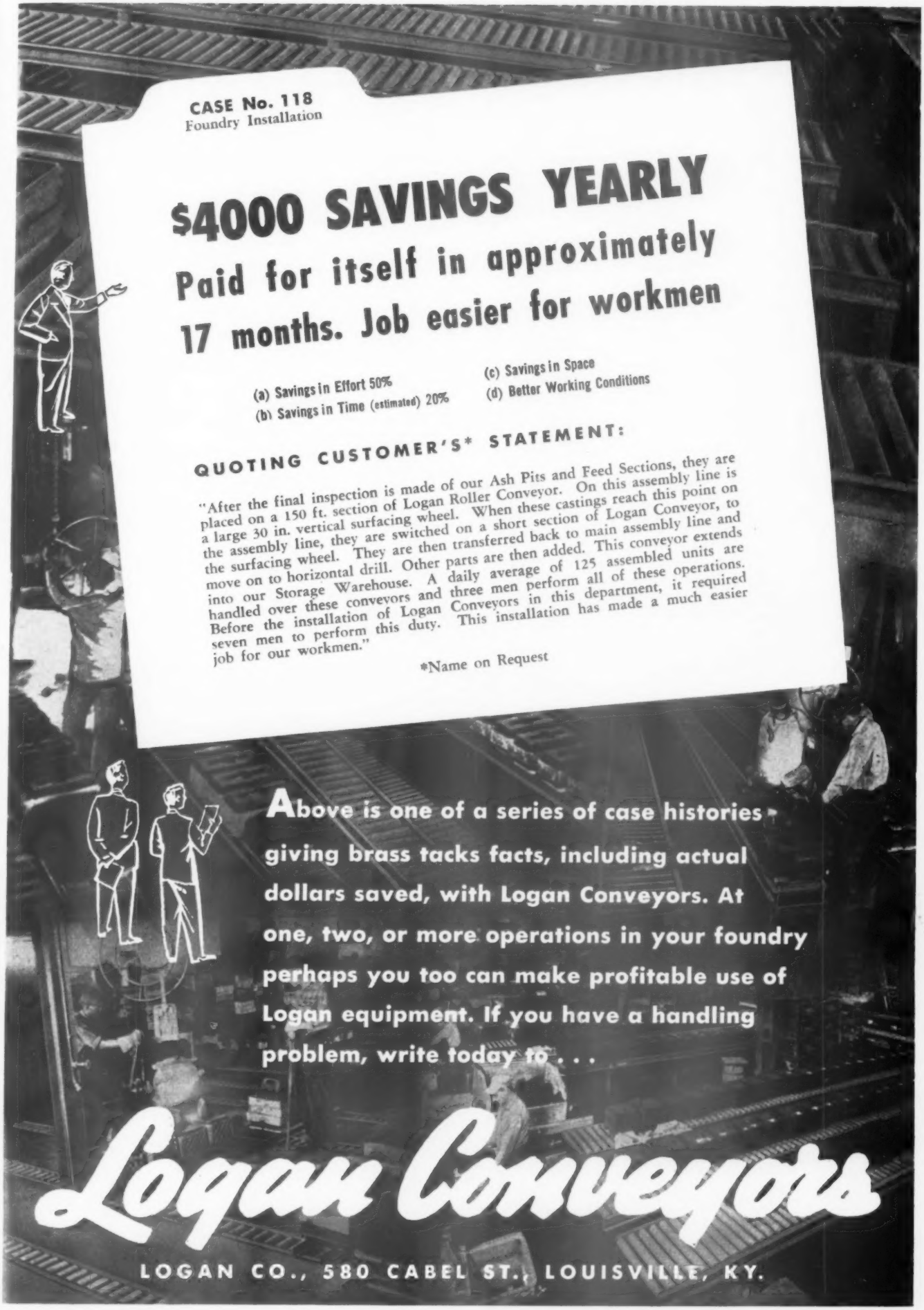
EXTENSIVE project now underway at the National Bureau of Standards is the revision of all the common thermocouple tables in order to take into account the recent changes in electrical units and in the International Temperature Scale. Present plans call for the publication during 1950 of eight tables giving the temperature-emf relations for plainum-platinum rhodium, chromel-alumel, and copper-constantan thermocouples. Each table with its converse will be issued as an NBS miscellaneous publication, and when announced will be available from the Superintendent of Documents, Government Printing Office, Washington. Inquiries and suggestions regarding the tables should be addressed to Dr. Robert J. Corruccini, Pyrometry Laboratory, National Bureau of Standards, Washington 25.

* * *

ELECTRONIC torch developed by scientists of General Electric Co., and still in the laboratory stage, produces temperatures higher than the melting point of tungsten (3370° C; 6098°F). Device combines high-frequency radio signals and various gases to produce heat. Heart of the torch is a magnetron which produces radio waves with a frequency of one billion cycles per second. If certain gases, such as nitrogen and carbon dioxide, are fed past the high-frequency arc, they are broken up into atomic form in the jet. An object placed in the jet causes the atoms to rejoin and form molecules of gas. That reaction generates the high temperature.

* * *

NEW MOLYBDENUM sulphide lubricant is available in liquid form for use alone or for addition to other oils for carrying to the friction surfaces. Material is said to possess chemical stability and retain its properties in extremes of temperature from subzero to red-heat.


CASE No. 118
Foundry Installation
$4000 SAVINGS YEARLY
Paid for itself in approximately 17 months. Job easier for workmen
(a) Savings in Effort 50%
(b) Savings in Time (estimated) 20%
(c) Savings in Space
(d) Better Working Conditions
QUOTING CUSTOMER'S* STATEMENT:
"After the final inspection is made of our Ash Pits and Feed Sections, they are placed on a 150 ft. section of Logan Roller Conveyor. On this assembly line is a large 30 in. vertical surfacing wheel. When these castings reach this point on the assembly line, they are switched on a short section of Logan Conveyor, to the surfacing wheel. They are then transferred back to main assembly line and move on to horizontal drill. Other parts are then added. This conveyor extends into our Storage Warehouse. A daily average of 125 assembled units are handled over these conveyors and three men perform all of these operations. Before the installation of Logan Conveyors in this department, it required seven men to perform this duty. This installation has made a much easier job for our workmen."
*Name on Request
Above is one of a series of case histories giving brass tacks facts, including actual dollars saved, with Logan Conveyors. At one, two, or more operations in your foundry perhaps you too can make profitable use of Logan equipment. If you have a handling problem, write today to . . .
Logan Conveyors
LOGAN CO., 580 CABEL ST., LOUISVILLE, KY.

First Heat Poured at

University of Alabama's Foundry

By J. P. McCLENDON
Stockham Valves & Fittings, Birmingham

A RED letter day was observed at the University of Alabama on Jan. 31, when the first heat was poured in the school's new foundry.

It was a big day not only for the university's Department of Engineering, but also for the Birmingham District Chapter of the American Foundrymen's Society. Both groups, in co-operation with the Foundry Educational Foundation and members of the foundry and foundry equipment manufacturing industries, are responsible for the $80,000 project.

Representatives of the society contacted business leaders in the foundry industry—including S. D. Moxley, American Cast Iron Pipe Co. executive; Dr. James T. MacKenzie, Acipco technical director; L. N. Shannon, vice president, Stockham Valves & Fittings; C. P. Caldwell, president, Caldwell Foundry & Machine Co., and others. All agreed wholeheartedly with the proposed project—to build a complete foundry at the university and provide a full foundry course for students. They all contributed. From this discussion and through co-ordination of their efforts, under the direction of the Foundry Educational Foundation, has come the most modern and complete foundry building and laboratory of its kind. A thorough and complete foundry practice course, including metallurgical control along with sand analysis, is offered to students who will graduate with an engineering degree. This is the first large-scale foundry operation in the South devoted to educational purposes.

George K. Dreher, executive secretary of the Foundry Educational Foundation, Cleveland, was present to see this milestone in education unveiled.

With University President John M. Gallalee looking on, Warren Jeffrey, foundry instructor, tapped the cupola shortly after 3 p.m. and the molten iron was poured into new ladles. Under supervision of Mr. Jeffrey and Robert B. Oliver, associate professor, the students soon had poured all the molds. Castings poured were souvenir ash trays, and mold weights to be used later in production work at the foundry.

Prof. E. C. Wright, head of the Engineering Department, was busy throughout the day showing the many visitors about the foundry and laboratory buildings. Among the visitors were: L. N. Shannon, Morris Hawkins, and Pat McClendon, of Stockham Valves & Fittings; Dr. James T. MacKenzie and Don Williams of Acipco; C. P. Caldwell, chairman, Birmingham District Chapter, AFS; Ray Farrabee, vice president, Central Foundry Co.; A. W.

(*Concluded on page* 135)

Foundry scenes at University of Alabama. Right upper panel shows students of the foundry practice course, with their instructors. Center lower panel shows Prof. E. C. Wright, the university's Department of Engineering, with Dr. J. T. MacKenzie, American Cast Iron Pipe Co. Visitors at their right are L. N. Shannon, Stockham Valves & Fittings; A. W. Gregg, Whiting Corp.; C. P. Caldwell, Caldwell Foundry & Machine Co.

Fully sand excluding (built in air filters)
Combined handle and locking lever
Streamlined throughout. Easy to keep clean
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Jolt timer, adjustable to any number of jolts. Built into column
Fully enclosed oil operated turnover mechanism
Push button controls adapted for "shovel" operation
Patented anvil rests solidly on base plate when jolting and lifts automatically during turnover

Type B T Machines

Have been evolved from a long line of turnover moulding machines and we sincerely claim them to be freer from maintenance troubles than any comparable machines in the world. The jolt stroke is long and the impact solid and the powerful squeeze action eliminates both hand ramming and box clamping. Faster than any other turnover type machines, moulding times compare with "Straight-draw" or pin-lift methods, with the added advantage of being able to produce deep intricate moulds with green sand cods.

See one in action in Booth 1203 at the Foundry Convention in Cleveland

BRITISH MOULDING MACHINE CO. LTD.

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A Longer-lived Lining for Melting Stainless Steel & Refractory Alloys

IF you are melting stainless steel or heat-resisting alloys in high frequency induction furnaces, then Norton Magnorite Cement RM 1169 can benefit you three ways: (1) quick, inexpensive installation, (2) long life, (3) easy to patch. This is a mixture of electrically fused magnesia grain plus enough ceramic binder to insure dense packing for dry ramming. It matures in the first heat at inner edge only, and cracks do not go all the way through the lining to "short out" the furnace. Maximum use temperature is 3250°F.

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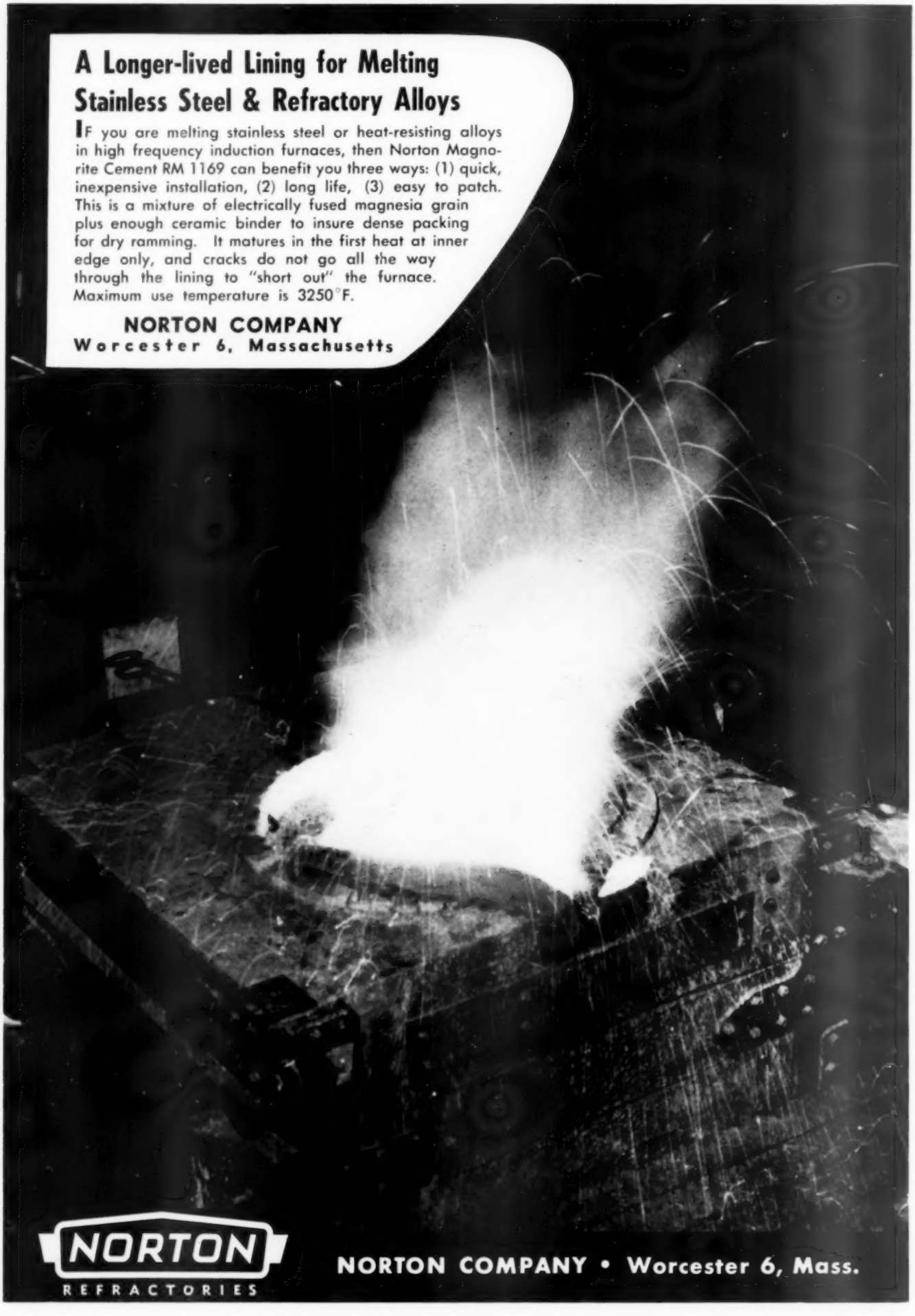


NORTON
REFRACTORIES

NORTON COMPANY • Worcester 6, Mass.

(*Concluded from page* 132)

Gregg, Whiting Corp.; Ray Frings and Harry Mouat; E. A. Brandler; Fred Eisman, Woodward Iron Co., and others.

The new foundry laboratory building, located adjacent to the Metallurgical Engineering Department, consists of a fireproof steel frame building 80 x 32 feet. The facilities permit such diverse types of melting as cupola furnace, electric arc, high frequency induction and gas-fired pit furnaces. Basic standard type molding machines are efficiently arranged on the west side of the laboratory. Auxiliary equipment includes a vibrating shakeout and hot sand belt conveyor, a bucket elevator to dump sand into the hopper prior to reconditioning in a sand mixer, a dust collector and exhaust system, core blowers, core oven, latest type grinders, sprue cutter, band saw for cutting off gates, and shot blast units. A roller type conveyor and overhead crane with swinging ladles make for easy and efficient pouring.

A further adjunct to the foundry laboratory is the fully equipped sand testing department where all the various tests developed for control of molding and core sands will be used for instructing students.

University of Alabama was the seventh school of twelve selected by the Foundry Educational Foundation to participate in its program. It is the intention of the Southeastern region to finance the program at the University of Alabama with funds to be solicited within the area, which includes 35,000 foundry workers and over 400 foundries.

One might say, literally, the foundrymen are going to mold the future leaders of their industry right at the University of Alabama.

NODULAR IRON

This digest of published data on nodular iron was presented at the New York State Regional Foundry Conference, at Syracuse University, Nov. 25-26

By F. R. MORRAL
Associate Professor
Materials Engineering Department
Syracuse University
Syracuse, N. Y.

GREAT interest in nodular iron is shown by the symposia organized by various groups to discuss the subject. Much has been written about the material, its properties and possible uses. This article summarizes information published on nodular iron as of November, 1949.

Table I presents the characteristic differences from the chemical point of view between nodular iron made by cerium additions and that made by magnesium additions.

Of the two types of addition agents, magnesium is the stronger desulphurizer, giving it an advantage over cerium. Magnesium has disadvantages, however, in the hazard inherent in its use and the fact that it must be used in more dilute alloys (10-20 per cent.) If magnesium is alloyed with copper and nickel, these metals will build up from the returning scrap.

The basic iron must be low in phosphorus (0.05 per cent maximum) and manganese (0.4 per cent) whether additions are made of cerium or magnesium if high ductility in the as cast condition is desired. An excess of either magnesium or cerium has been found detrimental to the ductility (per cent of elongation.) Too much magnesium also has been found to have an adverse effect on machinability and to cause increased iron shrinkage as the magnesium addition is increased. Alloys considered unsatisfactory as nodulizing additions are Mg-Ti, Mg-Ca and Mg-Mn.

The nodulizing effect of magnesium is not permanent, in fact it may be relatively short lived, if the iron is held at high temperature after the addition. In remelting the nodular iron, it will be found that the magnesium burns out and there is no carry-over of the nodulizing effect.

With cerium treatment it is necessary to have a hypereutectic iron. For magnesium, satisfactory results have been obtained with 2.5 per cent carbon irons. However, if high shrinkage is to be avoided, it is desirable to have the total carbon content greater than 3.5 per cent even in magnesium treated irons. In general, the additions should be made to the ladle in the form of small pieces, ¼ to ½-in. in diam. Table II compares nodular iron with gray cast iron from the processing point of view.

One investigator reported recently that the tensile-hardness relationship for nodular iron more nearly approaches steel than gray iron. He suggests making complete stress-strain curves for nodular iron and recommends use of transverse tests. Some workers have noted a yield point by using the proper speed in making the tensile strength test.

Several producers have made nodular iron in the electric furnace. These irons showed an elongation of 18 per cent in the as-cast condition and had a tensile strength of approximately 80,000 psi. Table III compares the properties of nodular iron with gray cast iron.

The nodular irons have many possibilities. There already are six basic types on the basis of chemical composition. In view of their ductility some improvements may be possible by working them. Considerable range in properties may be obtained by heat treatments such as annealing, interrupted quench, and flame or induction hardening of the surface.

TABLE I—Chemistry of Nodular Iron

	Cerium	Magnesium
Carbon	3.5% plus	2.5-4.0%
Sulphur	under 0.02%	under 0.005%
Phosphorus	0.05% max	
Manganese	0.40%	
Additions (effective range)	0.02-0.60%	0.05-0.07%
Cost per ton	$25 plus	$20 max

TABLE II—Processing Characteristics

	Nodular Iron	Gray Cast Iron
Castability		better
Flowability	equal or better	
Liquid shrinkage		less
Foundry control needed		less
Machinability (at same tensile strength)	better	
Weldability	equal	
Nondeforming (flame hardening, etc.)	equal	
Section sensitivity and chilling	*	
Cost		cheaper
Heat resistance	better	
Growth resistance	better	
Hot-working	better	

* Loss in strength on increase in section is less with nodular iron but sensitivity to chilling may be equal or greater than for gray cast iron.

TABLE III—Property Comparison

	Nodular Iron	Gray Cast Iron
Tensile strength in 1000 psi	65-115	50 plus
Compression strength in 1000 psi	125-180	80-220
Transverse rupture strength	2 × TS	18,000-28,000 psi
Yield strength (0.2% offset)	higher	30,000-90,000 psi
Yield point on testing	obtainable	unobtainable
Elongation—ductility (as cast)	1-18%	0
Modulus of elasticity (10^6 psi)	20.0-26.5	11.6-22.6
Hardness, bhn	150-650	150-270
Fatigue strength	0.40-0.59 TS	0.40-0.55 TS
Damping capacity	¼ that of gray iron	
Wear	equal	
Notch sensitivity:		
Static	better	
Dynamic		better
Impact strength (Izod)	higher	

Motion Study

(*Concluded from page* 81)

struct a chart showing details of the method in use. The analysis consisted of reviewing the film, frame by frame, with a special projector, to obtain the data with which to chart the original method, part of which is shown in Fig. 2.

Certain sections of the chart are marked "over-blast." These could not be determined from the film but were found with the aid of experimental data on the minimum required blasting time. The data were used, in drawing the chart, to denote that part of the blasting which was unnecessary, and is labeled "over-blast." The chart could have been made without film but use of film assured obtaining data on all men from the same cycle, was quicker, gave better accuracy, and provided a record to check the analysis as well as to demonstrate the validity of the analysis.

Develop Proposed Method

The procedure from here on was similar to that used in the first illustration. By the use of check lists suitable to such analyses, a proposed method was developed on paper. This proposed method, part of which is detailed in Fig. 3, permitted an accurate anticipation of the amount of time that would be required per cycle. The memomotion film was later used in the discussions prior to successful installation of the new method.

It is obvious that a considerable amount of work was necessary to obtain the savings originally summarized in the first tabulation but this work was more than repaid by the amount of savings.

One reason motion study worked so effectively in this foundry was that the managerial staff had, first of all, *an open mind*. They were willing to admit that costs might be reduced and that possibly the work methods in use were not as good as they might be. However, effective cost reduction work requires more than an open mind. The open mind is not to be confused with an empty mind. As well as the open mind, the people making the cost reduction analyses must have formal *knowledge concerning specific techniques to use to study the jobs in question*. This formal knowledge was acquired in these foundries through a formal training program which was given first to the top managerial staff consisting of the works manager and the various divisional superintendents. In fact, the illustrations given were devised by this group during the training period.

The training was subsequently extended to the lower echelons of management and the savings are continuing to come in at an extremely rapid rate.

Formal training in motion study is a prime prerequisite for a program of this type. In practically every foundry, drawings and design calculations are carried out in a formal manner by people specifically trained in such procedures. Foundries are even using radioactive isotopes to determine metallurgical results but have held back on the application of a scientific approach to labor usage. With labor constituting approximately 40 per cent of the foundry's sales dollar this is a preposterous situation.

The outline of the formal training course to which these men were exposed is given in the table on page 81.

Each of the conferences required that the men attend for three hours and do approximately three additional hours of work in the week between conferences. Consequently, when this foundry sought to reduce costs it had the tools to do the job. However, other factors in addition to knowledge just as vitally affected the success of the program. These factors were:

1. *The best way to train foremen is to train top management.* To know what the lower echelon of management should be doing, to adequately direct its activities and to set a proper example as well as evaluate the work done by the lower levels, it is necessary that top management, first of all, be fairly familiar with the procedures and techniques of motion and time study.

2. *Management must take an active part in the application of motion and time study.* This means that all of top management, including cost accounting and engineering as well as production management, must participate. Motion and time study may lead to changes in the selection of raw materials, the design of the product, the process or order of work on the product, the tools, equipment, work places, or the hand and body motions of the actual workers on the job. To properly integrate these five factors to produce the "one best way" obtainable with the available knowledge at any one time, it is necessary that all groups in the plant be equipped to and actively participate in the program.

3. *All conferences, as well as most of the auxiliary work, must be conducted on company time.* Unless plant management considers this activity sufficiently important to make it such a part of a person's job that he is expected to perform it on company time, it is not likely that sizable results may be expected.

4. *The works manager must actually inform the group that he feels motion and time study is an important phase of their job.* It takes an honest belief like this, borne out by the works manager's actions in faithfully attending the initial conferences, and avoiding all interruptions during them, to produce the original interest necessary for the men to gain sufficient familiarity with the techniques so that they may later prove the techniques worthwhileness to their own satisfaction. If the men can be stimulated into the extra effort to make the initial analyses during the training period they will convince themselves of the desirability of continuing to use them.

5. *The chief industrial engineer was moved into a position parallel to that of the chief engineer.* This provided the necessary respect for the work from the organizational aspect.

6. *The plant already possessed a capable motion and time study engineer who was able, with additional training, to co-ordinate the subsequent activity.* This chief industrial engineer was given additional training and actually helped in the operation of the course by providing the necessary services and assistance to the individuals engaged in applying the techniques.

Any foundry can duplicate these results provided its members are willing to meet the foregoing conditions, roll up their sleeves, learn, and actively go to work. Motion study can reduce costs.

References

1. *Systematic Motion and Time Study*, by M. E. Mundel, Prentice Hall, New York, 1947.
2. "Memo-motion Study Technique Simplifies Work Analysis," by M. E. Mundel, *Factory*, June, 1949.

Refractories Topic Of New Book

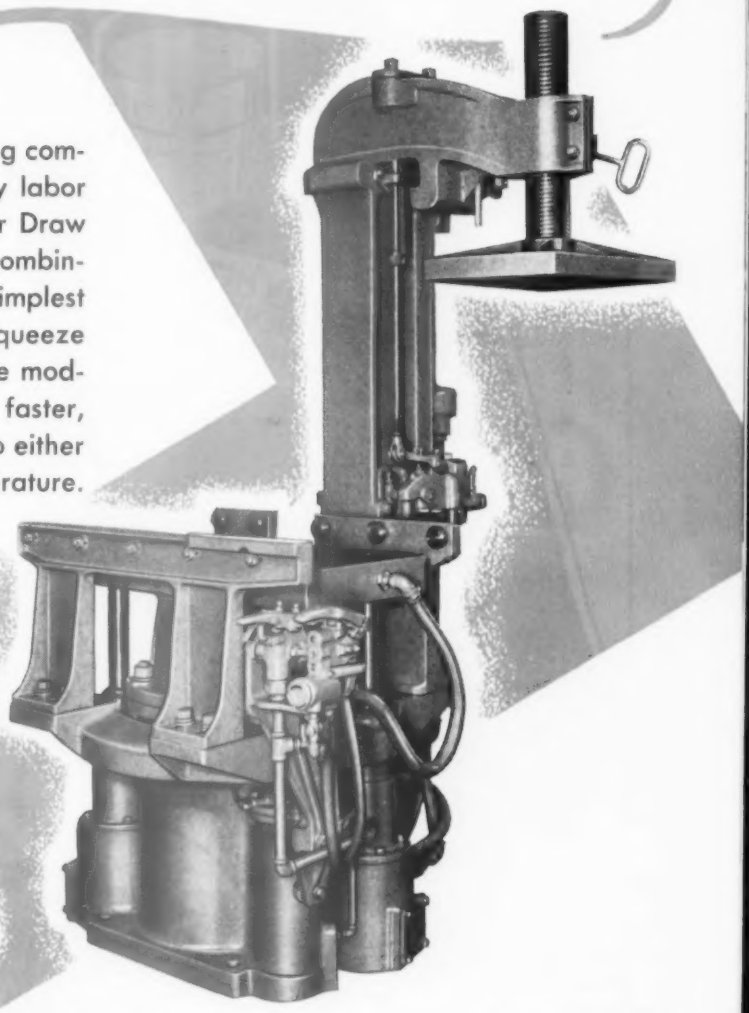
Mexico Refractories Co., Mexico, Mo., has published a 168-page illustrated book entitled "Better Refractories for the Furnaces of Industry." It outlines the history of the company and discusses sources of supply, research activities, and manufacturing processes.

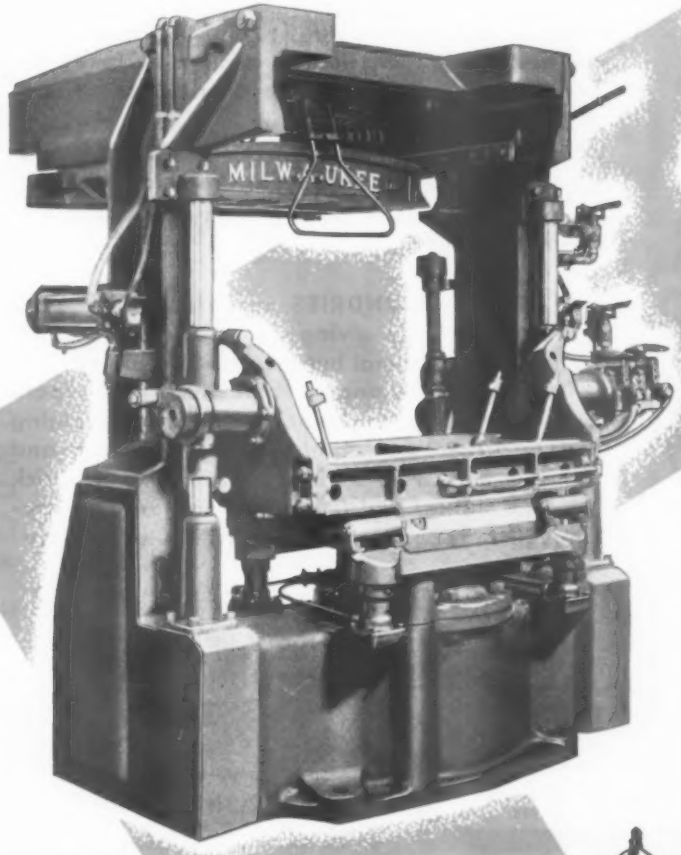
Sections of the book are devoted to standard and special shapes and specialty products. Activities of affiliated plants and the export division are described. The technical data section contains information on selection and application of refractories, glossary of terms, formulas and tables.

Take it from me . . . These

MILWAUKEE MOLDERS *are Cutting My Foundry Labor Costs to Rock Bottom*

If you operate a production foundry, here's a winning combination that will really help you to reduce foundry labor costs — (1) The MILWAUKEE Jolt Squeeze Rollover Draw with automatic leveling and smooth pattern draw, combining jolt, squeeze, rollover and pattern draw in the simplest possible operating cycle—(2) The MILWAUKEE Jolt Squeeze Stripper with roll-on and roll-off attachments. These modern molders enable you to produce better molds on a faster, more efficient basis. Both machines are adaptable to either short run work or long production runs. Write for literature.





MODEL 196 Milwaukee Jolt Squeeze Stripper with 19" diameter squeeze piston. Handles flasks 17" to 27" in width with a squeeze capacity of 22,500 lbs. at 80 lb. line pressure. Fast 5-step operation — Roll-on, Jolt, Squeeze, Strip and Roll-off. Automatic features enable ONE man to mold even the largest flasks.

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This Cupola Flux has a record of more than 32 years of success in casting improvement. It cleanses molten iron, makes it freer flowing, keeps slag fluid and reduces sulphur.

It has been, and continues to be, dependable insurance of sounder, cleaner castings, reduced rejects, and shops report definitely easier machining.

IT KEEPS CUPOLAS CLEANER, TOO. Bridging over is practically eliminated, drops are cleaner, life of lining is greatly prolonged, maintenance is greatly reduced.

MALLEABLE FOUNDRIES with Cupola Operation are not only giving their castings a better start with clean metal but are enjoying big savings in cupola maintenance. Famous Cornell Cupola Flux keeps cupolas cleaner. It reduces bridging over to a great extent, insures cleaner drops, and forms a glazed or vitrified surface on the brick or stone lining, which reduces erosion and prolongs the period between patching or replacement.

THE EXCLUSIVE SCORED BRICK FORM makes the fluxing operation very inexpensive.

Each brick is pre-measured, and all it takes is but a few seconds to lift it out of container and toss it into cupola with each ton charge of iron. Where charges of iron are smaller, you simply break off one to three briquettes (quarter sections) as per instructions.

Write for Bulletin No. 46-B

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CLEANSES MOLTEN ALUMINUM so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive Formula greatly reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

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CLEANSES MOLTEN BRASS even when dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves you considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

TERMS AND CONDITIONS OF SALE OF THE GRAY IRON FOUNDRY INDUSTRY

Originally Approved by the National Association of Purchasing Agents: March 11, 1931 and Reapproved with Amended Paragraphs 2 and 16 on September 19, 1949

GENERAL CONDITIONS

All quotations are made and all castings are sold upon the following terms and conditions:

1. Unless otherwise agreed, quotations must be accepted and patterns furnished the foundry within thirty (30) days from date of quotation.

2. All castings are sold as unmachined castings, with heads, gates, fins and similar extraneous metal removed, f.o.b. cars, foundry point. Terms—thirty (30) days net, from invoice date, unless otherwise stated.

3. Claims for error in weight or number must be made within ten (10) days after the receipt of castings.

4. Foundry is responsible for the replacement of castings rejected due to foundry defects and such castings must be reported and returned to the foundry within ninety (90) days after their receipt. Foundry is not responsible for machine work, welding, labor charges or other losses or damages caused by defective castings unless otherwise agreed in writing.

5. Foundry is not responsible for loss of or damage to patterns by fire or other casualties beyond its control.

6. Foundry shall not be liable in damages for failure to deliver as a result of fires, strikes, differences with employees, accidents or other causes beyond its control.

QUOTATIONS

7. Blue prints submitted for estimating purposes should be marked with rough casting weight, if known, or an estimated weight upon which quotation will be based. A detailed description of the pattern equipment should be furnished.

8. When quotations involve the making of piece prices, definite weights shall be established and agreed upon, and quotations shall be subject to revision on any variation from the established weights.

9. Unless otherwise specified by the foundry, quotations are based on castings with gates, fins and other projections removed to approximately the contour of the pattern.

Courtesy of the Gray Iron Founders' Society, Cleveland.

ORDERS

10. No order shall be changed unless notice of revision is made and accepted in writing before work is in process. If work is in process, customer is to be charged for any castings made as well as cost of cores, molds or equipment discarded because of such changes.

11. Cancellations of orders are to be made only by mutual consent of buyer and seller.

12. Unless otherwise stipulated, the customer shall accept an overrun of ten per cent above quantities specified on order. However, the foundry is to make an effort at all times to furnish as near the exact quantity specified as operating conditions will permit.

13. If customer requires special production service to secure unusual deliveries, an extra charge shall be made.

PATTERNS & CORE BOX EQUIPMENT

14. Customer must supply pattern and core box equipment in condition to produce economically the quality and quantity of castings required.

15. An extra charge will be made if patterns require stopping off or if skeleton or sweep pattern equipment is furnished.

16. Foundry is not responsible for variations existing between blue prints and pattern and core box equipment supplied by customer. If requested by customer, foundry will check patterns and core box equipment with blueprints at customer's expense, unless otherwise agreed to by the foundry.

17. All patterns, core boxes and loose pieces thereof, should be marked properly for identification.

18. Follow boards, core driers and similar devices when required, are to be furnished by customer.

19. Repairs and changes to patterns by customer's orders will be made at expense of customer.

20. All freight, drayage, boxing and crating charges on patterns, both to and from the foundry, shall be assumed by customer.

21. Pattern storage facilities are provided by foundry for active patterns only. Patterns not in use for a period of six (6) months will be returned to the owner or will be subject to storage charges.

SUGGESTIONS TO BUYERS OF GRAY IRON PRODUCTS

The following suggestions to buyers of gray iron products are offered for the purpose of enabling gray iron foundries to better serve their customers. It is believed that these recommendations, if followed, will avoid misunderstandings, promote greater accuracy in estimating on new work, and result in the purchaser receiving the best possible castings and service. It is suggested that the following information be supplied to foundries which are asked to quote on new work:

1. Kind of iron. Standard specification (preferably one promulgated by the American Society for Testing Materials) or description of industrial application or service requirements which the castings must satisfy.

2. Sample casting or detailed drawing or both—drawing should show: (a) name and number of parts, (b) actual or estimated weight of the casting, (c) important dimensions, (d) dimension tolerances, (e) surfaces to be machined and amount of finish to be allowed, (f) special requirements, such as finish, testing, gaging, special tolerances, disk or special grinding, drilling, tapping, etc., and (g) specific location for symbol or pattern numbers or trade marks and type of symbols or numbers preferred (raised or sunken).

3. Number of pieces to be ordered off each pattern with delivery dates and schedules.

4. Description of available pattern equipment and its condition, indicating type of patterns. If loose, the number of patterns and whether suitable for mounting on plate, specifying loose pieces, if any. If gated, number of patterns on gate; if two or more different patterns are on the same gate, whether equal quantities of castings off all different patterns will be ordered. If plated, number of patterns on plate, indicating plate material (steel, aluminum, wood, etc.) and for what size flask. If cope and drag, number of patterns on board and for what size flask.

5. Material from which pattern is constructed: wood (hard or soft), brass, aluminum, white metal, iron, etc.

6. Number of core boxes. Kind and type, such as: dump, split, loose pieces; number of cores per casting; number of cores to each box; material from which core box is made; whether designed for core blowing machines; number and kind of core dryers, cores gages, scribing jigs, etc.

7. If no pattern is available and foundry is to provide pattern at customers' expense, customer should state whether substantially permanent patterns are to be constructed. If the foundry is not to provide patterns or special flasks it should be consulted as to how such equipment should be made.

8. Description of flasks, if available. Quantity, size, cope height, drag height, type and construction (steel, aluminum or wood) should be given.

9. Special tests. If pressure tests are required, indicate nature of test and where and by whom to be performed. If mechanical property tests are required and test bars are to be provided, specify nature of tests (as per A.S.T.M. or other specifications) and where and by whom tests are to be made.

10. State whether piece prices or per-pound prices are desired, f.o.b. point, and whether separate price on pattern equipment is wanted.

11. Indicate any special crating, marking, packing or routing desired.

12. Indicate special treatment, if any, such as sand blasting, pickling, annealing, heat treating, normalizing, japanning, painting, enameling, etc.

13. Describe in detail any difficulties encountered in connection with the same casting purchased previously.

14. Make it a point to confer with a foundryman regarding castings requirements before the patterns are made—preferably while the design is still on the drafting board. Through suggestions based on experience, he can often help you get castings best suited to your needs.

Dust Control At Foundry Shake-Out. "Buffalo" Static Air Washer in Background

DUST CONTROL MEANS PROFIT CONTROL WITH "Buffalo" EQUIPMENT IN THE FOUNDRY!

Clean air in the foundry promotes production, reduces waste and protects workers' health. These are some of the "profit" jobs "Buffalo" Air Washers are doing in foundries.

Specialists in industrial air handling, "Buffalo" engineers treat the problem of foundry air cleaning exactly as any other industrial air problem. Efficiency and ease of operation, low cost of operation and maintenance are of paramount importance on such jobs.

Why not investigate "Buffalo" Air Cleaning Equipment? Find out how economical it can be in *your* Foundry!

WRITE FOR BULLETIN 3181-A

"Buffalo" Air Washers are still built on the proven basic principles established by "Buffalo" fifty years ago, with many improved features added for easier installation and maintenance. In a complete range of combinations and sizes.

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Branch Offices in All Principal Cities

Man-to-Man

ON THE MOLDER'S BENCH

By RALPH L. LEE

"Mechanized Magic"

I SURE do have one whale of a lot to learn about this pet foundry business of mine; it just seems that the more I learn the more there is to learn. Take this last foundry trip of mine out on the West coast. I saw a bench molder using a two-pronged doo-hickey, something on the order of a stub tuning fork for rapping patterns. It struck me as a darned good idea and I wondered why I hadn't run into it before. In fact, I made a sketch of it, intending to make one for myself as soon as I got back home to the LEE HOBBY FOUNDRY and maybe send news of my find into THE FOUNDRY. But checking around with some of the old timers out there I soon found that it was an old, old story to them.

Then there was another thing I ran into out there—it was their use of the word "mechanized." I'd been using this word all my life and thought I knew what it meant, but they used it as though it had a special meaning to foundrymen, one entirely different to those on the inside than to those on the outside, including me.

During the shop talk I noticed that someone would say something like this: "Oh! You mean Jerry Orfnick —the Reliable Foundry? Yes, they are mechanized and have been for over a year now. But the other outfit you're talking about isn't. I know for a fact, I was just over there not over three weeks ago."

What threw me for a loop was that, the way these folks talked, a person would think there was a very definite line separating foundries that could rightly be called mechanized from those who couldn't. I started to wonder just where that line was.

To me as an amateur, if you substituted an air hose for a bellows, that was mechanizing; hooking up a vibrator on a bench or pattern plate was too. So was an air hammer instead of a cold chisel and hand hammer. Or a power riddle, a power hoist or crane, tumbling mill, muller, core blowers; or a power truck instead of hand trucks; mold, sand and metal conveyors—even a time clock or an adding machine are all examples of mechanizing.

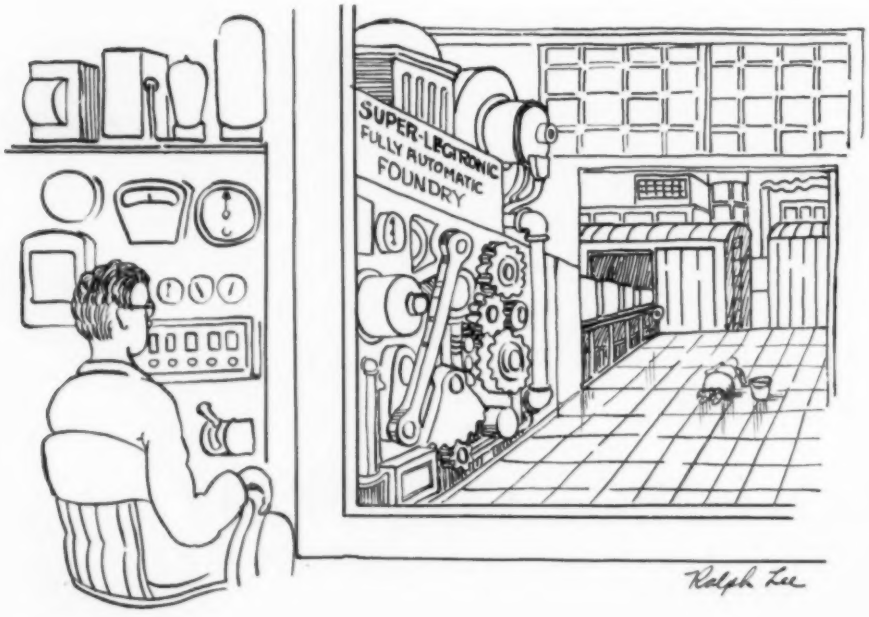
Looking at the word in this light, it struck me that of all the hundreds of foundries I have been in in my time, I don't believe there was one that *wasn't* mechanized, at least to some extent. In fact the LEE FOUNDRY would have every right to consider itself mechanized.

I raised this question with some of my friends out there and couldn't get a very satisfactory answer; they usually changed the subject too soon and with a slight inference that those of such tender years in the craft couldn't be expected to grasp some of these adult facts of foundry life.

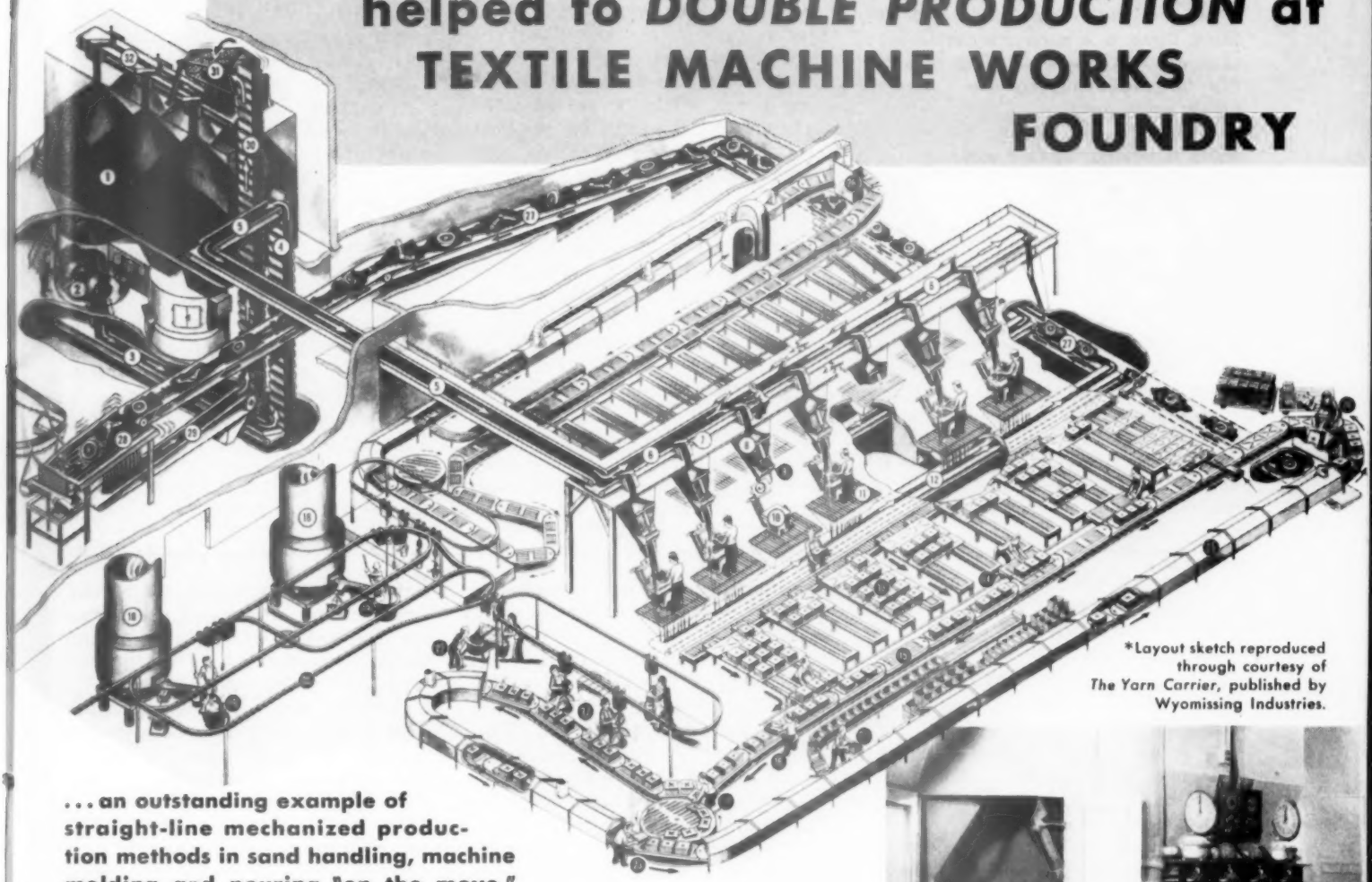
However, after FBI'ing along the trail and adding together the twos and twos I had picked up, it occurred to me that maybe certain foundrymen had drifted along with the current of popular talk and speculation to a point of feeling that, along with the atom bomb, flying disks, television and radar, there has been developed some new system of time study, layout, conveyors, equipment and stuff which, under the name of mechanization and for a sizable consideration, could literally lift the face and rejuvenate the glands of a foundry; dragging it across the railroad tracks into a new neighborhood of industrial affluence and prestige.

I don't think there is anything grander to see than one of these continuous molding operations (when it is running, of course) wham-whaming along, with the sand going in here and the smoke and the dust coming out there, cores flowing in a steady stream—pouring keeping step —melting keeping step — shakeout, snagging, round and round we go.

(*Concluded on page* 144)



How NATIONAL *Mechanized* EQUIPMENT helped to *DOUBLE PRODUCTION* at TEXTILE MACHINE WORKS FOUNDRY



*Layout sketch reproduced through courtesy of *The Yarn Carrier*, published by Wyomissing Industries.

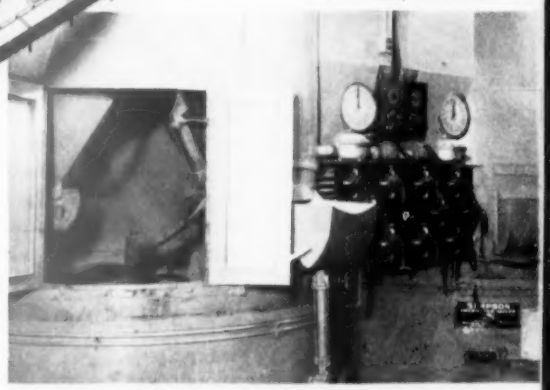
...an outstanding example of straight-line mechanized production methods in sand handling, machine molding and pouring "on the move."

TEXTILE MACHINE WORKS, Reading, Pa., are already famous for operating one of the largest, most modern foundries in the country. Now, adding to that accomplishment, this progressive company has completed installation of the highly mechanized unit shown here* for large-scale production of small and medium size gray iron castings. Designed and installed by National Engineering, in conjunction with Mr. H. P. Good and the Foundry Division of Textile Machine Works, reports on this equipment show these results:

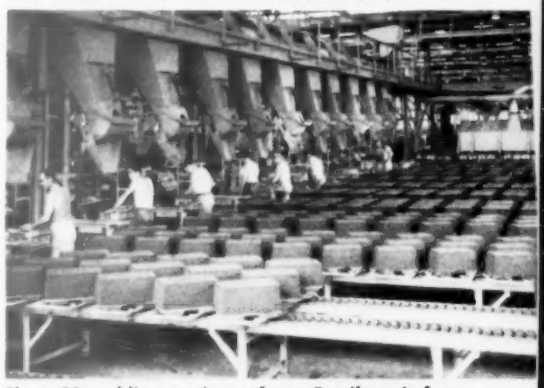
> *Production has been practically doubled, without increasing floor space. Quality has been maintained, without any increase in scrap percentage. Production per molder per day has nearly tripled. Costs have been reduced considerably, with comparable increases in molders' earnings.*

With the appreciable per pound saving in casting cost made possible through this mechanization program, the entire investment is expected to pay for itself in 5 years. Here, then, is a practical, *mechanized* answer to the problem of increased production of highest quality castings at lower cost.

Let a National Engineer show you how these methods can be applied to solve your production problems. Write for further details.



Two SIMPSOM MIXERS at Textile Machine Works, each producing 3500 lb. batches of properly prepared sand.



These 12 molding stations of one Textile unit face 15 stations of the second unit—both served by individual power mold conveyors.

SIMPSON Intensive MIXERS

NATIONAL *Engineering Company*

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents for Continental European Countries—George Fischer Limited, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

Send for Bulletin

describing the complete Textile Machine Works installation. Write for your copy today.

(*Concluded from page* 142)

But on the other hand, I don't think there is a sorrier sight to see than one of these same kinds of outfits limping along on one cylinder being supplemented with temporary benches and sand heaps along the walls struggling toward a better day (we hope).

Maybe the day will come when we can sit in a tiled control room facing an instrument panel with little chrome-plated levers and buttons, while the super-duper 100 per cent mechanized m i r a c l e silently and swiftly turns out oodles and oodles of super-quality castings all individually wrapped in cellophane.

Speaking as an amateur, something tells me that with sand being what it is, molten metal being what it is and customers being what they are, this heyday is bound to be quite some long distance in the future.

When you get right down to it, there is no mystery and surely no magic in the most completely mechanized foundry in existence. Broken down it will surely be proved to be made up of just about 95 per cent of the common ordinary things most foundries have and do. The only difference, as far as I can see, will be that such a foundry has gone farther toward the goal of being laid out, equipped and operated to turn out an *estimated* quantity of similar castings at an *estimated* rate with a minimum of lost motion, back-tracking and back-bending at the lowest possible cost consistent with acceptable quality.

To my way of thinking, even the smallest foundry which cannot even be spoken of in the same breath with the word "mechanized" (atomic-age usage) can be laid out to do a job, with minimum lost motion, back-tracking and back-bending and to do this without high-priced equipment.

Being hypnotized by the word "mechanized" might be like raising a smoke screen for hiding the perfectly doable things we know we can and should do with the quantity and kind of work the plant, tools and the men we now have. Of course, there will always be nice things we would like to have.

Up in Vancouver I saw one fine little foundry where they had gone down to Sears, Roebuck and bought themselves a set of overhead tracks and fittings like dairymen use to haul cow manure out of the stable. They use it for toting metal from the furnace to the pouring floors. I'm thinking of getting me a few yards for the LEE FOUNDRY.

Ceramic Molds

(*Concluded from page* 86)

ceramic coating materials—much the same as metal surfaces are porcelain enameled. A single glaze coating will reduce surface porosity enough for most casting purposes, but two glaze coatings are applied when a high-gloss finish is desired.

Permanent molds made according to the foregoing procedure may have most of the design features of sand molds, if necessary, and can withstand the temperatures required to cast many types of iron and steel as well as alloys in the lower-temperature ranges.

Refractory materials of the types used in investment casting are not normally adaptable for use in permanent mold casting, since their composition is such that they can be readily damaged. However, there are a number of castable refractories which do not suffer from the latter disadvantage.

For example, in the Stainless Steel Products plant at Burbank, Calif., plaster compositions have been used to make open type permanent molds for casting alloys at temperatures of 500 to 1000° F. The mold materials in this case are mechanically mixed with warm water for creamy consistency, and have been satisfactorily cast on plaster patterns when the latter were carefully coated with hospital green liquid soap. Resultant defects due to air bubbles were either minimized or eliminated by attaching the mold to a machine-vibrated surface so that air bubbles will be dissipated as it solidifies.

Setting of the plaster will usually take place in about 30 minutes, after which a pattern is removed from each mold cavity so that the latter can be dehydrated by heating to temperatures of about 450 or 500° F. Silicone varnishes are sometimes used after the dehydration process to seal and increase the strength of cavity surfaces.

Castable refractories of the types used to line ultra-high temperature furnaces are often coarse in texture and exceedingly brittle; but, if handled with sufficient care, molds made with such refractories might each be used to produce several iron or steel castings which are analogous to sand castings.

Whether molds of this type are being used in casting metal products cannot be authoritatively stated at this time. However, it is a rather well known fact that such tooling has been used in the production of glassware for many years; and that the conditions involved in casting glassware are very similar to the circumstances encountered in casting metals at temperatures of 1500° F or less.

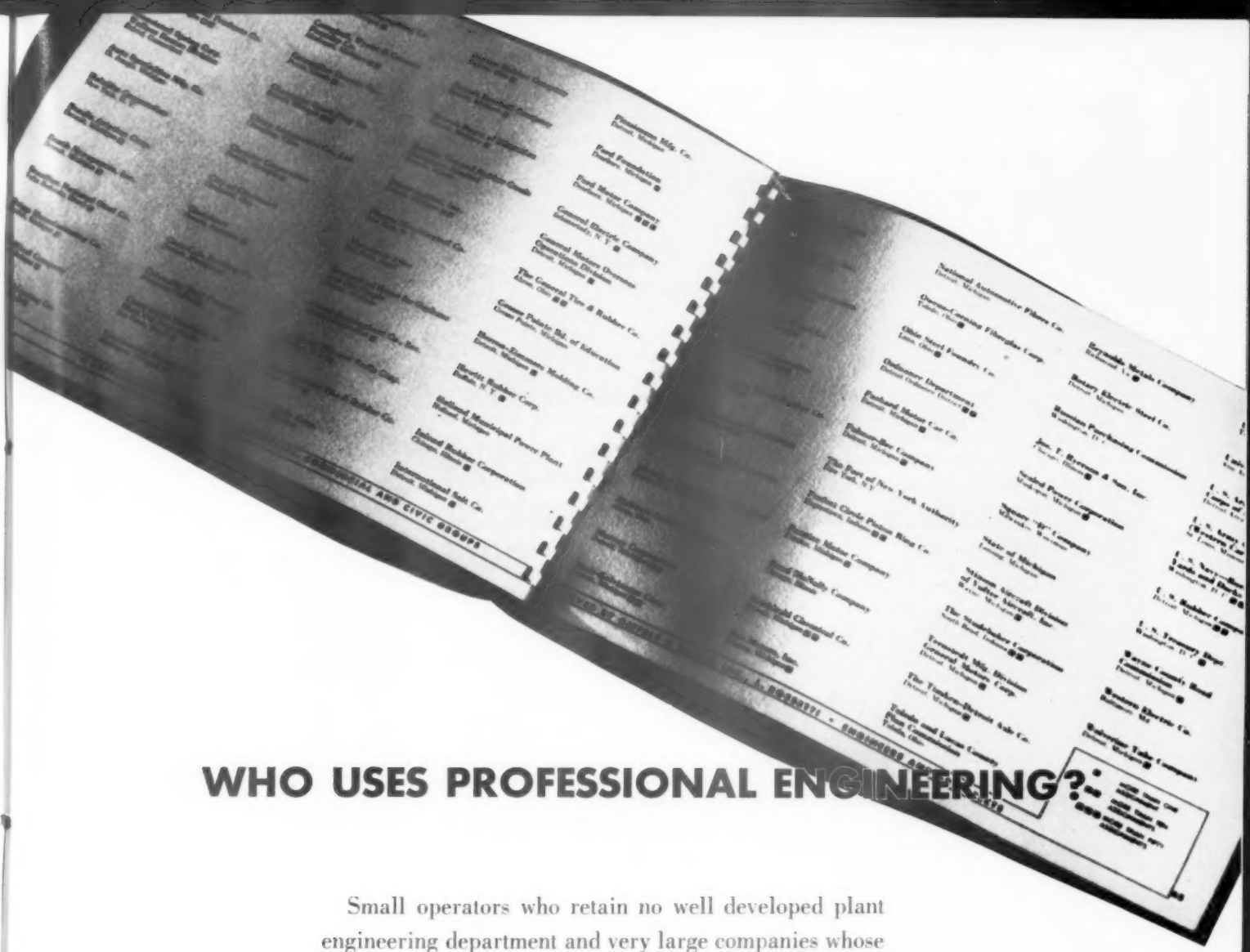
Compositions and Properties of Typical Ceramic Materials

Name or Material Type	Typical Ingredients	Melting Pt., °F	Chemical Resistance	Specific Gravity	Tensile Strength, per 1000 psi	Linear Expansion Coeff.*
Glass	Silicon, carbon, iron and other metallic oxides	1000 to approx. 2500	Sol. in hydrofluoric acid only	2.2–2.6	6–7	1.8–5.4
Porcelain Enamel	Silicon, sulfur, zirconia and other metallic oxides	1500 to approx. 3000	Similar to glass	2.5–3.0	1.5–10.0	8.0–12.0
Pottery Clay	Silica, calcium, aluminum, sodium and other metallic oxides	1800 to approx. 3000	Similar to glass	1.8–4.0	2.0–9.0	3.5–5.0
High-heat Refractory	Silica and aluminum oxide	3000 to 5000, approx.	May have little resistance to acids or alkalies	3.0-4.5	1–36	.000001-.000006

* Computed as the product of 10^6/°F (0-90° F)

Uses and Potential Uses for Ceramic Molds

Ceramic Type	Mold Type	Alloys Which May Be Cast	Limitations
Glass	Open, permanent for very small articles	Lead, aluminum, magnesium, zinc, etc.	High costs, danger of thermal shock damage or breakage.
Porcelain enamel	Used to increase heat resistance of permanent steel molds	Lead, aluminum, magnesium, zinc, copper, and some grades of iron or steel	Special finishing and firing equipment is required; enamel can be readily chipped sometimes by careless handling.
Pottery clay	Permanent molds similar to most types of sand molds	Same as in porcelain-enameled molds	Thick mold walls may be required to minimize effects of thermal shock; special ceramic production equipment is required.
Plaster-type refractories	Temporary and permanent molds of all types	Virtually all types	Molds will not normally have high mechanical strength properties.
Fireclay or firebrick refractories	Permanent molds similar to most types of sand molds	Virtually all types	Are relatively expensive to fabricate, and can be damaged by carelessness in many circumstances.



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GIFFELS & VALLET, INC.

INDUSTRIAL ENGINEERING DIVISION
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Spectrometric Analysis of Bronze

(*Continued from page* 93)

than 3 per cent, demonstrating the excellence of control of the spark-like discharge case, particularly in view of the extreme percentages involved. Furthermore, the results were duplicated after having the samples rerun on the spectrograph several months later. For routine control, precision and reproducibility of bronze alloys proved to be adequate, although lead showed a greater variation than the other constituents due to inclusions and segregation of this element.

Having devised a method for handling complex metallurgical bronze specimens, the next approach to the analysis of bronze was to select proper lines and plot the analytical or "working curves." These analytical curves were based on known chemical values of the elements to be determined. Spectrum lines for bronze and the alloys, given in Table IV, were selected primarily on the basis of freedom from interference by the other constituents and the relative intensity of the lines in respect to the internal Cu standard lines. Also, the proximity of the analysis line to the reference line and the response of the photographic emulsion were considered.

Using the standard analytical procedure to produce working analytical curves,[4] the concentration values expressed in per cent were plotted logarithmically on the ordinate scale against the values of the intensity ratio plotted logarithmically on the abscissa scale.

In our initial attempt to provide analytical working curves, the various types of bronze samples with known values were sparked and plotted. Unexpected and perplexing difficulties were encountered in the analytical procedure. The applied technique yielded analytical curves for tin, zinc, and lead with a spread of points, distributed about the curves. To explain the variation of points, the next consideration was given to the effect of one element on the apparent concentration of the other. A marked effect of one element upon another was experienced by several authors.[5] Specimens of the same composition, but with varying amounts of only one element were selected and plotted. In our procedure, this was found not to be the cause for the phenomenon of random fluctuation and variation of the points.

Upon examination of these extreme displacements, it certainly was significant that they were caused by the complexity and the metallurgical condition of the alloy. The variable melting practices and pouring temperatures at the foundries possibly resulted in nonhomogeneity in a multi-component alloy. The microstructure and grain size influenced by the rate of cooling contributed, to a degree, to the change of temperature of sample excitation, affecting the rate of surface evaporation, and producing variations in spectral response to intensity of the various elements in the discharge.

Samples Sparked and Plotted

Therefore, bearing these facts in mind, the samples were sparked and plotted according to the sources of purchase. The application of this technique proved to be successful. The intensity values were plotted and the points gave a straight line. This method actually permitted the consideration and evaluation of metallurgical heterogeneity, physical state, and other effects of the samples. Fig. 3 shows the analytical curves for tin, zinc, nickel and lead. Most of the curves produced are straight, following the natural pattern. Some had a tendency to a slight concavity. The phenomenon of this abnormal change is due to the variation in the composition of the major constituents,[6, 7] and self absorption of the lines.

The degree of comparison between the chemical and spectrographic results is indicated in Table V. These results indicate the degree of performance and reliability of the method to be expected. The data of comparison indicates the method is well adapted to routine control plus the usual spectrographic speed of analysis. The application of spectrographic analysis makes it possible for quantitative work on a wide variety of forms and gages of alloys submitted to the spectrographer. Analysis of bronze constituents with high percentages of alloy was developed in our laboratory to aid in the rapid acceptance or rejection of the material.

TABLE III—Intensity Ratios of Internal Standard and Reference Lines and Average Deviation of Intensity

Sample No.	Intensity Ratios	1	2	3	4	5	6	7	8	Average	Average Deviation of Intensity
1	I Sn / I Cu	1.13	1.13	1.12	1.13	1.16	1.15	1.15	1.15	1.14	1.2
2		1.20	1.19	1.20	1.19	1.21	1.21	1.20	1.20	1.20	0.9
3		1.00	1.00	1.05	1.05	1.05	1.06	1.06	1.05	1.04	2.3
4		1.10	1.10	1.11	1.14	1.14	1.15	1.16	1.14	1.13	2.3
1	I Zn / I Cu	1.05	1.05	1.06	1.06	1.00	1.00	1.05	1.05	1.04	1.8
2		1.70	1.74	1.70	1.70	1.74	1.63	1.65	1.64	1.69	2.4
3		1.52	1.51	1.51	1.50	1.51	1.50	1.47	1.48	1.50	1.1
4		1.31	1.30	1.34	1.30	1.34	1.35	1.35	1.35	1.33	1.6

TABLE IV—LINES EMPLOYED IN ANALYSIS OF BRONZE

(Wavelengths in Angstroms)

Element	Analytical Line	Internal Cu Line	Concentration Range
Ni	2437.888	2441.637	0.50–1.50
	2416.138	2441.637	0.10–0.60
Sn	3330.594	3337.844	8.00–12.5
	2421.693	2441.637	6.00–8.00
	2429.495	2441.637	4.00–6.00
Pb	2476.379	2441.637	5.00–9.00
	2833.061	2882.931	0.10–1.75
	2833.061	3010.839	1.50–3.00
Zn	3315.020	3337.844	0.25–2.00
	3302.588	3010.839	2.00–4.00

TABLE V—COMPARISON OF SPECTROGRAPHIC AND CHEMICAL DETERMINATIONS

	Spectro.	Chem.	Dev.
Sn	11.12%	11.11%	0.01%
	11.25	11.30	0.05
	11.80	11.92	0.12
	10.95	10.86	0.09
	10.75	10.92	0.17
	10.40	10.51	0.11
	10.45	10.59	0.14
	11.12	11.13	0.01
Zn	3.04%	2.93%	0.11%
	3.02	2.94	0.08
	2.46	2.79	0.33
	3.02	3.02	0.00
	2.45	2.57	0.12
	2.75	2.81	0.06
	3.17	3.07	0.10
	2.68	2.60	0.08

Important savings result from the added speed and control of the spectrographic analysis, justifying the initial cost of the spectrographic equipment involved.

The author wishes to express his appreciation to the chemical and spectrographic departments for the co-operation received in checking the numerous samples and the assistance rendered in achieving a spectrographic method for the determination of bronze compositions.

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8 OUTSTANDING FEATURES:

1. Large stationary work area of convenient height. All work can be done right on the machine table, eliminating unnecessary handling of core boxes.
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3. Stationary sand magazine that has a unique loading device eliminating the usual time and effort consuming operation of moving the magazine from filling to blowing position.
4. Easy accurate locating of core boxes against stationary magazine heads.
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8. * Actuating one handle puts the machine through the complete cycle of clamping the core box, blowing the core and releasing the core box, in two seconds.

*Any core blowing machine will blow a core in a few seconds. Related operations and human fatigue are the important factors in setting your rate of production. The New Redford has been developed to give both unequalled performance and unequalled ease of operation.

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FOUNDRY Statistics

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1948	1949
Jan.	380.9	149.9
Feb.	367.3	144.4
Mar.	326.2	190.8
Apr.	412.0	172.0
May	388.5	121.9
June	376.8	164.9
July	456.3	146.6
Aug.	324.7	127.1
Sept.	273.5	166.6
Oct.	296.0	133.5
Nov.	284.4	270.4
Dec.	243.7	201.0

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	Oct. 1949	Sept. 1949	Oct. 1948
Iron & steel	171,600	173,700	234,300
Nonferrous	64,100	62,000	74,400

AVERAGE WEEKLY EARNINGS:

Gray Iron	$56.18	$55.07	$59.41
Malleable Iron	52.32	54.01	63.29
Steel	56.12	53.54	62.27
Nonferrous	62.21	61.54	61.88

AVERAGE WEEKLY HOURS:

Gray Iron	38.4	37.8	41.0
Malleable Iron	34.4	35.0	41.1
Steel	36.9	35.2	40.7
Nonferrous	39.4	39.3	40.0

LABOR TURNOVER RATE (OCT).

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	3.1	4.9	0.9	3.7
Malleable Iron	2.2	2.2	0.9	0.9
Steel	2.3	4.1	0.6	3.2

Source: Bureau of Labor Statistics.

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1948
May	11,114	23,716
June	9,696	24,401
July	10,220	20,456
Aug.	14,194	24,098
Sept.	16,208	23,641
Oct.	18,036	21,559
Nov.	18,488	21,731
Dec.	17,960	20,954
Total	175,643	279,500

Source: Ingot Brass and Bronze Industry.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments: Total	Shipments: For Sale	Unfilled *Orders
1947			
Total	12,540,960	7,181,299	.....
1948			
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
11 mos. total	11,675,397	6,506,666	.....
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,164	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989
July	696,915	341,657	1,031,963
Aug.	872,013	445,981	1,048,308
Sept.	880,647	459,014	980,070
Oct.	715,685	397,939	955,100
Nov.	718,703	395,107	938,629
11 mos. total	9,687,112	5,077,361	.....

Malleable

(Net tons)

	Shipments: Total	Shipments: For Sale	Unfilled *Orders
1947			
Total	895,054	513,228	.....
1948			
Aug.	73,272	41,201	176,824
Sept.	77,815	43,985	164,002
Oct.	81,761	44,305	158,351
Nov.	77,194	42,241	146,422
11 mos. total	853,383	481,815	.....
Dec.	79,882	43,397	137,385
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar.	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865
July	44,360	23,216	70,796
Aug.	58,121	30,327	61,330
Sept.	60,488	30,646	57,512
Oct.	57,150	28,582	54,322
Nov.	49,439	25,250	55,795
11 mos. total	655,728	341,288	.....

Steel

(Net tons)

	Shipments: Total	Shipments: For Sale	Unfilled *Orders
1947			
Total	1,625,055	1,203,504	.....
1948			
Sept.	149,222	112,551	447,972
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
11 mos. total	1,602,637	1,219,010	.....
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473
June	116,052	84,112	173,237
July	78,710	50,124	155,494
Aug.	89,964	59,412	143,566
Sept.	86,502	55,853	127,664
Oct.	70,690	48,263	124,817
Nov.	76,437	50,685	117,865
11 mos. total	1,158,994	812,218	.....

Aluminum

(Thousands of pounds)

	Shipments: Total	Shipments: Sand	Shipments: Perm. Mold	Shipments: Die	Unfilled *Orders
1947					
Total	441,996	155,112	174,515	110,538	.....
1948					
Sept.	35,877	11,822	13,353	10,218	66,773
Oct.	35,542	11,733	13,216	10,158	65,538
Nov.	34,550	11,410	13,012	9,640	63,767
11 mos. total	392,654	129,446	149,745	109,448	.....
Dec.	31,836	10,335	11,589	9,290	59,154
Total	424,490	139,781	161,334	118,738	.....
1949					
Jan.	29,142	9,702	10,386	8,490	55,580
Feb.	27,228	9,286	9,339	7,795	52,916
Mar.	27,478	9,348	9,386	7,999	50,508
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,582	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159
July	18,621	6,311	6,592	5,180	36,993
Aug.	23,997	9,048	8,326	6,119	38,130
Sept.	27,546	9,923	9,491	7,623	38,179
Oct.	29,071	9,634	9,923	8,908	37,881
Nov.	26,317	9,212	8,315	8,348	36,846
11 mos. total	277,854	96,755	95,194	79,589	.....

Magnesium

(Thousands of pounds)

	Shipments: Total	Shipments: For Sale	Unfilled *Orders
1947			
Total	7,693	7,050	....
1948			
Sept.	745	700	3,206
Oct.	708	650	3,070
11 mos. total	7,460	6,793	....
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,586
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025
July	689	637	3,073
Aug.	753	712	3,107
Sept.	727	691	3,015
Oct.	796	763	3,050
Nov.	801	769	2,399
11 mos. total	8,583	8,043	....

* For sale only.

Copper-base Alloys

(Thousands of pounds)

	Shipments: Total	Shipments: Sand	Shipments: Perm. Mold	Unfilled *Orders
1947				
Total	1,051,742	960,732	51,139	.....
1948				
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
11 mos. total	942,643	851,040	54,213	.....
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786
July	43,273	39,372	2,129	26,013
Aug.	58,055	53,203	2,929	26,071
Sept.	60,771	55,221	2,729	26,527
Oct.	58,249	52,861	2,316	23,634
Nov.	61,818	56,669	2,811	23,625
11 mos. total	661,445	596,153	34,225	.....

NEW
CUTS Y

Osborn No. 193
Draw Type
Core Blowing Machine
equipped with new
automatic controls.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland 14, Ohio

w OSBORN AUTOMATIC CONTROL
TS YOUR CORE BLOWING COSTS!

PRODUCTIVE **. . . double-box operation . . . permits operator to draw core from one box while another core box is being blown.**

FAST **. . . shorter operating cycle than with manual valve controls.**

SAFE **. . . retains safety features of manually-operated core blowers.**

SIMPLE, **completely self-contained . . . rugged construction designed specifically for foundry operation.**

VERSATILE **. . . can be used on diaphragm or draw type Osborn Core Blowing Machines.**

THE new improved automatic controls are another example of Osborn's many developments resulting from constant research for better equipment to meet the ever changing needs of the foundry industry. For over 18 years, Osborn has pioneered the manufacture of automatic controls for core blowers to increase output and cut core costs.

To improve your foundry moulding and core blowing operations and cut your foundry costs, why not consult the Osborn Factory Representative. Call or wire.

OSBORN

MOULDING MACHINES CORE BLOWING MACHINES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

AROUND Detroit

New type shot blasting machine cleans internal water passages of V-8 cylinder block castings. . . . Frederic B. Stevens Inc., 65-year-old foundry supplies company, merges with Udylite Corp.

NEW foundry and motor plant of Ford Motor Co. will be built on a 200-acre site in Brookpark, Cleveland suburb. The two units will provide approximately 1,700,000 sq ft of plant space and will employ nearly 10,000 workers, when operating at capacity. With increased plant space, the production foundry and motor plant at the Rouge will be improved and facilities added.

Construction of the plant is expected to take almost two years, and will provide facilities for turning out more than 4000 six and eight cylinder motors daily. The new unit is the first Ford manufacturing plant in the Cleveland area and will make that company one of the largest employers in that section.

* * *

THROUGH application of a special process for the internal cleaning of engine blocks, Ford Motor Co. has practically ruled out the possibility of engine trouble developing due to inadequate block cleaning, says Logan Miller, general manager, Rouge Division.

The process employs a new shot blast cleaning machine, the first of its kind in the automotive industry. It guarantees additional protection against core sand remaining in the internal cylinder block water passages.

This machine supplements conventional equipment now in use to remove burnt core and molding sand and scale from interior and exterior surfaces of the motor block casting.

Ford ultimately plans to equip each of the production foundry's motor block cleaning systems with the new compressed air blast cabinets.

The new blasting technique works this way: Motor blocks to be blasted are brought by conveyor one at a time into the blast cabinet. Two work positioning arms, one for each side of the casting, register the block in correct position for applying the blast of shot. The blast is blown through 16 nozzles under air pressure of 85 psi.

The air-driven shot strikes hidden sand or scale, freeing it from the metal's surface. The loosened material then can be removed from the block's interior. Surfaces of the water jacket, crevices and thin sectional openings are blasted clean—exposing bright virgin metal to the cooling water circulated from the radiator.

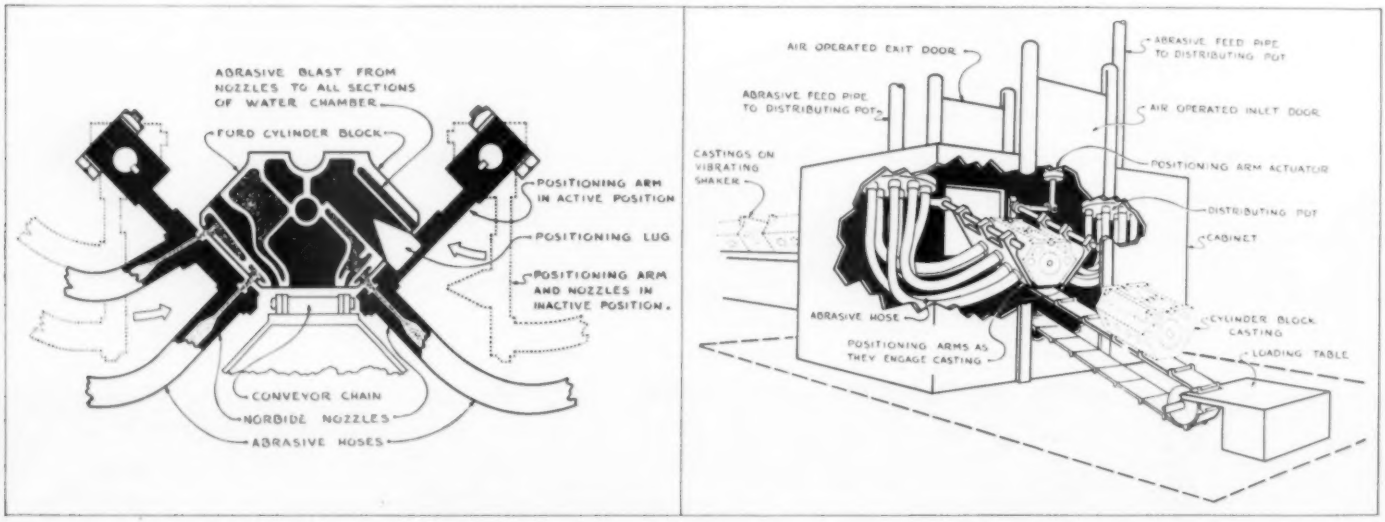
Material used in the blast process consists of iron or steel shot and grit. The air blast equipment operates automatically, the blast period being controlled by a timer.

* * *

THROUGH agreement covering exchange of stock, Frederic B. Stevens Inc., 65-year-old manufacturer and distributor of foundry supplies, will merge with the Udylite Corp., Detroit, a leading interest in the plating equipment and supply field, and will operate as a division of that company. Formal details of the consolidation are in course of preparation and will be submitted to Udylite stockholders at the company's annual meeting Apr. 27.

Long a familiar name in foundry circles, the Stevens company was founded by the late Frederic B. Stevens. It has plants in Detroit, New Haven, Conn., and Buffalo; wholly owned subsidiaries in Windsor, Ont., and Springfield, O., with offices and warehouses in principal cities. Combination of the resources of the two companies will permit an accelerated program of research and development which should be of mutual advantage. Efforts of the Stevens company will be devoted exclusively to promoting and expanding its nation-wide foundry sup-

(*Concluded on page* 154)



New type shot blast machine used by Ford Motor Co. to clean internal water passages in cylinder blocks

Ferro Silicon

50%—65%—75%—90%

Shipped in Lump and Crushed Sizes
Bulk or Packed

BRIQUETTES:
2½ lb. Containing 1 lb. Silicon
5 lb. Containing 2 lb. Silicon

●

Ferro Manganese

78-82% Mn. Standard
Shipped in Lump and Crushed Sizes

BRIQUETTES:
3 lb. Containing 2 lb. Manganese

Pig Iron

"DIAMOND D"

Machine Cast—Low Phosphorous
High Carbon—Low Manganese
Preferred for
"Nodular Graphite Cast Iron"
and all White Iron
Castings

●

"ROCKWOOD"

Machine Cast
Malleable and Foundry Grade
.15% to .30% Phosphorous
Preferred for
Automotive, Malleable and
General Castings

"Radiant" Foundry Coke

Size 3 inch and up, Carbon 86 to 90%, Low Sulphur,
Hard Dense Structure, Suitable for all Cupola Melting Operations.

TENNESSEE PRODUCTS & CHEMICAL CORPORATION

GENERAL OFFICES: NASHVILLE, TENNESSEE

PLANTS AT CHATTANOOGA, ROCKWOOD AND WRIGLEY, TENN.

Represented by

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EXPORT AGENTS: ORE & FERRO CORPORATION, 30 Broad St., New York

(*Concluded from page* 152)

ply business, and should be in a stronger position after conclusion of the merger to move ahead in this field. No changes in identity, management or service to the foundry trade are in prospect. Products include a full line of foundry facings, equipment and supplies; buffing and polishing compositions; electroplaters' equipment and supplies; face brick, fire brick and refractories.

Udylite was organized in Kokomo, Ind., in 1927 by Marvin Udy to exploit his new process of rustproofing metals by electroplating. Transfer to Detroit came in 1934 and incorporation as Udylite Corp. in 1939.

OHIO REGIONAL FOUNDRY CONFERENCE

Scheduled for Cincinnati, Mar. 10-11

SIXTEEN technical sessions covering a diversified list of subjects are scheduled for the third Ohio Regional Foundry Conference. The two-day meeting, sponsored by the five Ohio chapters of the American Foundrymen's Society, is to be held at the Netherland Plaza Hotel, Cincinnati, Friday and Saturday, Mar. 10-11.

The University of Cincinnati, one of the Foundry Educational Foundation schools, is co-operating with the host Cincinnati Chapter in program arrangements along with the Canton District, Central Ohio, Northeastern Ohio and Toledo Chapters of the AFS. Edward H. King, the Hill & Griffith Co., Cincinnati, is general chairman of the conference. Co-chairmen representing the other Ohio chapters are: Dr. Douglas Williams, Ohio State University, Columbus; George Biggert, United Engineering & Foundry Co., Canton, and T. W. Harvey, Pitcairn Co., Barberton; H. G. Schwab, Bunting Brass & Bronze Co., Toledo; S. E. Kelly, Eberhard Mfg. Co., and Fred J. Pfarr, Lake City Malleable Co., Cleveland.

In addition to the technical sessions devoted to individual metals, a general session on the subject of quality control will open the conference Friday morning. This meeting also will be addressed by Dr. Raymond Walters, president, University of Cincinnati. Luncheon sessions on Friday and Saturday and a dinner Friday evening complete the program. Conference reservations are being handled by Charles Dold, Portsmouth Steel Co., Carew Tower, Cincinnati 2.

The detailed program follows:

Friday, March 10

8:30 a.m.—Registration

10 a.m.—General Session: "Industry's Stake in Education," by Dr. Raymond Walters, president, University of Cincinnati. Keynote speakers: L. G. Mitten, instructor, Industrial Engineering Department, Ohio State University, "Quality Control"; Harry Placke, G. H. R. Foundry Division, Dayton, O., "Quality Control in Actual Practice"

12:15 p.m.—Luncheon

2 p.m.—

Gray Iron: "The Cupola—Its Raw Materials and Operation," by Bernard P. Mulcahy, Fuel Research Laboratory Inc., Indianapolis

Nonferrous: "The Effect of Melting Practice on Casting Quality—Tin Bronzes," by George P. Halliwell, H. Kramer & Co., Chicago

Malleable Iron: "The Effect of Oxidation in Cupola Melting on Annealability of Malleable Iron," by Milton Tilley, metallurgist, National Malleable & Steel Castings Co., Cleveland

Steel: "Use of Metallurgical Oxygen at American Steel Foundries," by L. L. Whitney, American Steel Foundries, Chicago.

3:30 p.m.—

Gray Iron: "Gating and Risering," by Harry H. Kessler, general manager, Sorbo-Mat Process Engineers, St. Louis

Nonferrous: "Determination of Melt Quality—Tin Bronzes," by Dr. L. W. Eastwood, Battelle Memorial Institute, Columbus, O.

Malleable Iron: "Direct Air Furnace Melting," by Robert O. Mayer, assistant general manager, Haven Malleable Castings Co., Cincinnati; "Zirconium in Malleable Iron," by John Varga, Case Institute of Technology and Howard Biell, Lake City Malleable Co., Cleveland

Steel: "Effect of Melting Practice on Hydrogen," by Sam F. Carter, American Cast Iron Pipe Co., Birmingham.

7 p.m.—Regional Conference Dinner: "Human Relationships," by Edward McFaul

Netherland Plaza Hotel, Cincinnati, will be site of Ohio Regional Foundry Conference

Saturday, March 11

7:30 a.m.—Ohio State University breakfast for graduates who have entered the foundry industry

8:30 a.m.—Registration

9:30 a.m.—

Gray Iron: "Quality Castings Require Good Sand Practice," by Tom Barlow, sales manager, Eastern Clay Products Co., Jackson, O.

Malleable Iron: "Pearlitic Malleable Irons," by Gordon B. Mannweiler, metallurgist, Eastern Malleable Iron Co., Naugatuck, Conn.

Nonferrous: "Control of Quality of Aluminum Alloy Castings," by R. R. Senz, Aluminum Co. of America, Cleveland

Steel—"Use of Exothermic Materials as Aids to Better Feeding," by Michael Bock, Exomet Inc., Conneaut, O.

11 a.m.—

Gray Iron: "Controls and Tests for Quality Castings in the Smaller Foundry," by A. D. Barczak, plant manager, Superior Foundry Inc., Cleveland

Malleable Iron: "Consolidating, Estimating and Costing Through Effective Control," by Dickey Dyer, Dyer Engineers Inc., Cleveland

Nonferrous: "Effect of Gating and Risering on Magnesium Casting Quality," by H. E. Elliot, Dow Chemical Co., Bay City, Mich.

Steel: "Reuse and Reclamation of Steel Foundry Sand," by Clifford Wenninger, foundry department, Industrial Engineering Department, University of Kentucky, Lexington, Ky.

12:15 p.m.—Luncheon. Recognition of national officers. Program by Cincinnati Chapter of the AFS.

Offers Standards Manuals

Various standards committees representing plant divisions of Allis-Chalmers Mfg. Co., Milwaukee, have issued three new pocket size manuals, available upon request from the company's health and safety department.

One pertains to grinding standards, a 32-page booklet providing supervisory personnel with an outline and explanation of those standards which have been established to assist in assuring safe, trouble-free grinder operation on the various types of grinders in use.

A 20-page grinding practices manual designates rules and safe practices for various grinders mentioned in the standards manual, and carries helpful tables of correct revolutions per minute for specified surface speeds and decimal equivalents.

A 20-page trucking manual describes safe practices for various shop trucking operations.

ASM Plans Congress and Exposition

Thirty-second annual meeting of the American Society for Metals, featuring the Metal Congress and Exposition, will be held Oct. 23-27 in the International Amphitheatre at Chicago. W. H. Eisenman, executive secretary of the ASM and managing director of the Metal Show, has announced that floor plans have been made available and the exposition's space-assignment committee will meet Mar. 20.

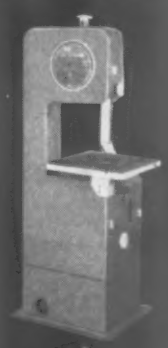
Sponsoring the 1950 Metal Congress and Exposition, in addition to American Society for Metals, will be: American Welding Society; Metals Branch-American Institute of Mining and Metallurgical Engineers; and the Society for Non-Destructive Testing.

Efficiency of . . .
Continuous BAND CUTTING
Now Extended to the CUTTING of ALL SOLID MATERIALS

New DoALL Band Machines and cutting tools for 1950 give up to 200% faster production cutting and up to 100% longer tool life in the trimming and cutting of ferrous and non-ferrous castings. Tough alloys that have defied economical cutting are now profitably sliced apart with ease on DoALL Band Machines and cutting tools.

Only DoALL gives you a range of sizes, kinds and operating speeds that are tailored to your specific needs.

Super Zephyr — High Speed and Friction Sawing Machine with 36" capacity — 21 models tailored to your needs in speed range.



Low-Cost Utility DoALLs — 5 models — various speeds — 16" capacity.

Contour Machines—5 models — 16" to 60" capacity — variable speeds.

Contour-matic—the first Band Machine Tool with complete Hydraulic Operation and variable speed range from 40 to 10,000 F.P.M.

SEE DEMONSTRATIONS at FOUNDRY CONVENTION
Cleveland, May 8–12

These latest Foundry and Pattern Shop Machine Tools will be in operation cutting all kinds of castings, patterns, etc. demonstrating:

Friction Sawing **Contour Sawing**
Line Grinding **High Speed Sawing**

DoALL Exhibit No. 1200

27 Kinds BAND CUTTING TOOLS

for

Line Milling
Line Grinding
Contour Sawing
Friction Sawing
Continuous Filing
Polishing
Honing

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WRITE for literature and information
That will give you . . .
FREE DEMONSTRATIONS IN YOUR PLANT
No obligation, of course.

CORE BLOWING

(*Continued from page* 83)

weight was determined when the top of the mercury meniscus was exactly flush with the top of the box. The volume of the mercury was thus not equal to the volume of the box, but the difference in volume was relatively small and equal for both coreboxes. Therefore, the error in the ratio of the volumes of the two boxes (the desired information) was negligible. Data for the ratio determination will be found in Appendix II.

Results of Experimental Work—Experimental data were obtained for a corebox with the conventional amount of venting and for one with the maximum possible amount of venting. Blowholes were used ranging in size from ¼-in. to 1-in. diameter. The former was the minimum blowhole size recommended by anyone in the literature. Blowholes larger than 1 in. were not feasible since the core produced had a cross section 1 in. square.

Maximum air pressure used was 75 psi. This is approximately equal to the air line pressure usually available in foundries but is somewhat below the maximum air pressures reported in the literature. This was not considered to be a sufficiently serious deficiency to warrant the installation of a booster since the object of the experiment was to demonstrate the relative effects of variations in pressure rather than the absolute effect of air pressure on the particular corebox shape chosen for this experiment.

The data are tabulated in Appendix I and plotted for the regular corebox in Fig. 1 and for the screen corebox in Fig. 2. The experimental points for the ¾, ⅞, and 1-in. blowholes were so close together that only one line on the graphs was used to indicate the results for all three orifice sizes. To demonstrate the affect of differences in the amount of vent area a few of the curves from both Figs. 1 and 2 were replotted on the same graph, Fig. 3.

Discussion of Results—The experimental data obtained agree closely with current industrial practice as reported by Pridmore[6] and Dwyer[7]. On the basis of this close agreement it is justifiable to consider some of the points brought out by this report: The extent to which these points can be considered conclusions will depend on the extent to which they are verified by a number of foundries using different types of core blowing machines with their own sand mixtures and their own core shapes.

Other factors remaining constant, there is a minimum optimum blowhole diameter. This orifice size appears to be invariant with pressure and venting arrangement. Below this diameter the sand will not pack as well. Increasing the diameter beyond this value offers no advantages in packing the sand but may increase the mechanical complications.

The contention of Madacey[10] and Dwyer[7] that to produce equivalent cores with lower air pressure requires the use of larger blowholes is confirmed, provided the original blowhole diameter was less than the optimum size. This point is brought out more clearly if the information from Fig. 1 is replotted as shown in Fig. 4. This graph also demonstrates the fact that although the core becomes heavier as the air pressure is increased, the gain in weight obtained by 10-psi increments in pressure becomes progressively less as the absolute pressure is increased.

The data reported neither confirm nor contradict Lincoln's[1] contention that a small blowhole will increase the "throwing power" of the sand. The data do suggest an alternate method for accomplishing the desired result; namely, employing the optimum blowhole size and using vents to direct the sand to the hard-to-reach portions of the core.

Fig. 3 demonstrates the point that within the experimental error a conventionally vented corebox is equal to or better than one containing the maximum possible amount of vent area. It is interesting to observe that with the blowhole size found to be optimum for this set of conditions, the results obtained with both coreboxes are the same within the accuracy of the work.

In all cases except the three lightest cores produced (those weighing less than 176 grams) the corebox was satisfactorily filled with the sand. Thus the fact that it is possible to produce usable cores when conditions are far from optimum greatly enhance the versatility of the core blowing method.

It should be noted that the results reported apply only when well maintained corebox equipment is used. The practice of varying blowhole diameter and venting arrangement in order to eliminate "worm holes" is not recommended even though such methods will sometimes accomplish the desired results. These defects are caused by leaks, or in the case of multi-cavity coreboxes by air blowing across from one cavity into the adjoining one. They should be eliminated by repairing the corebox.

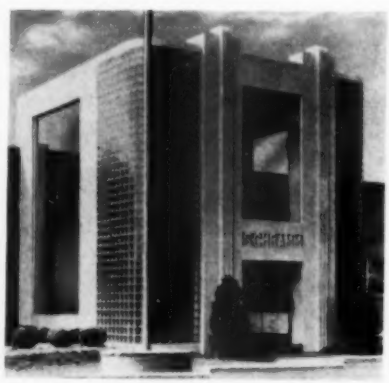
Conclusions—The production of foundry sand cores by the core blowing method was studied as a function of blowhole diameter, vent area and air pressure. For the particular fixed conditions of this experiment, namely, the type of core blowing machine, the sand mixture and the corebox shape, the following results were obtained:

1. A minimum blowhole diameter of ¾-in. yielded the heaviest cores with both venting arrangements and was invariant with air pressure.

(*Continued on page* 158)

Air Compressor Company Is in Its 50th Year

SCHRAMM Inc., West Chester, Pa., manufacturer of air compressors, is celebrating its fiftieth anniversary this year. Started by Chris D. Schramm on Jan. 2, 1900, as a modest machine shop in Philadelphia, the company originally was dedicated to the servicing and selling of gas engines.



In 1901 Henry N. Schramm, now president, joined his father at a time when electric ignition was being developed for gas engines. Together they developed a make-and-break spark ignition head that established them as gas engine experts along the Atlantic seaboard. The next important development, occurring in 1908, was the first complete, portable, engine-driven compressor. It featured interchangeability of parts which has remained characteristic of all company compressors.

Continued expansion of the business made necessary acquisition of larger factory facilities in 1917 at West Chester, where the present, modern factory covers an area of 17 acres.

Installed in 1937

and still competitive and highly efficient today

BOTH past and present performance of the Bartlett-Snow equipment in the grey iron foundry of this large mid-western automobile manufacturer, demonstrates the ability of Bartlett-Snow engineers to accurately analyze foundry problems, and then design, build and install equipment that will repay its initial cost within a short time,—and return handsome profits to the purchaser for years and years thereafter.

The shakeout and spill sand in this foundry is collected on conveyors in the basement, passed through a rotary cooling screen, mulled and aerated. The prepared sand is then handled on an inclined 24" belt conveyor (see view above) eliminating the need for bucket elevators, and distributed over the fly wheel line molding machines. Sand not needed by the eight molding station on the fly wheel line is carried to the head line on a cross belt, thus permitting sand to be distributed to two complete loops. The continuous mold conveyor loop shown above consists of 95 cars of Bartlett-Snow's heavy duty, two axle, four wheel design with steel plate tops 20" wide with 5'-0" centers.

Let the Bartlett-Snow foundry engineers, with their long and intimate experience with the needs of practical day to day foundry operation, work with you on your next sand, mold, or castings handling problem. It's your assurance that all equipment will be designed to adequately serve both present and future needs; and synchronized and coordinated into an efficient, compact, profitable and easy to operate unit. The C. O. Bartlett & Snow Company, Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit and Chicago.

BARTLETT-SNOW
CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

Unistage

RESULT OF

50 Years of Dependable Service

Model 105 *Unistage* Compressor on base with Motor, horizontal air receiver and cooling unit.

FOR PRODUCTION and MAINTENANCE FOR SPEEDY PNEUMATIC TOOLS

SCHRAMM INC. offers a complete line of Industrial Compressors in sizes ranging from ... 2 to 600 cubic feet displacement ... Built and designed for continuous heavy duty service with a minimum of attention.

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(*Continued from page* 156)

2. For blowhole diameters smaller than ¾-in. the normally vented corebox yielded heavier cores than the box which had the maximum amount of venting. For ¾-in. and larger the results obtained with both boxes were equivalent within the experimental error.

3. Within the range of air pressures tried, increasing the pressure increased the core weight but the advantage obtained by successive increases in pressure became progressively less.

4. It was possible to fill the corebox satisfactorily with even the lowest pressure (25 psi) tried.

Acknowledgments — The writer wishes to express his indebtedness and gratitude to:

Mr. S. A. Weigand for some of the techniques used in this research.

Members of the staff of the Massachusetts Institute of Technology for assistance and advice in many details pertaining to the work reported here.

The Klein-Farris Co. for providing the coreblower and some of the foundry supplies used.

The Foundry Educational Foundation for the financial assistance which made the work possible.

APPENDIX I

(Experimental Data)

Air Pressure (psi)	Regular Corebox — Blowhole Diam. (in.)	Regular Corebox — Core Weight (grams)
25	.250	172.7
	.375	180.7
	.500	186.6
	.625	188.5
	.750	190.1
	.875	190.1
	1.000	190.1
32½	.250	176.9
	.375	184.0
	.500	188.2
	.625	190.6
	.750	191.3
	.875	191.8
	1.000	191.6
40	.250	180.1
	.375	185.7
	.500	190.0
	.625	191.9
	.750	192.8
	.875	192.8
	1.000	192.9
55	.250	183.0
	.375	188.6
	.500	191.8
	.625	194.3
	.750	194.7
	.875	194.7
	1.000	194.2
75	.250	187.0
	.375	191.2
	.500	193.8
	.625	195.0
	.750	195.9
	.875	195.8
	1.000	195.9

Air Pressure (psi)	Screen Corebox — Blowhole Diam. (inches)	Core Weight (grams) — Experimental Value	Core Weight (grams) — Corrected to Volume of Regular Corebox
25	.250	176.0	163.6
	.375	189.1	175.8
	.500	197.8	183.8
	.625	202.1	187.8
	.750	202.9	188.6
	.875	203.1	188.8
	1.000	202.8	188.5
40	.250	186.7	173.5
	.375	195.7	181.9
	.500	202.6	188.3
	.625	205.3	190.8
	.750	208.2	193.5
	.875	208.1	193.4
	1.000	208.3	193.6

(*Concluded on page* 160)

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A Jeffrey apron conveyor used for sprueing and sorting castings.

A typical view of Jeffrey sand handling and preparation in a large foundry.

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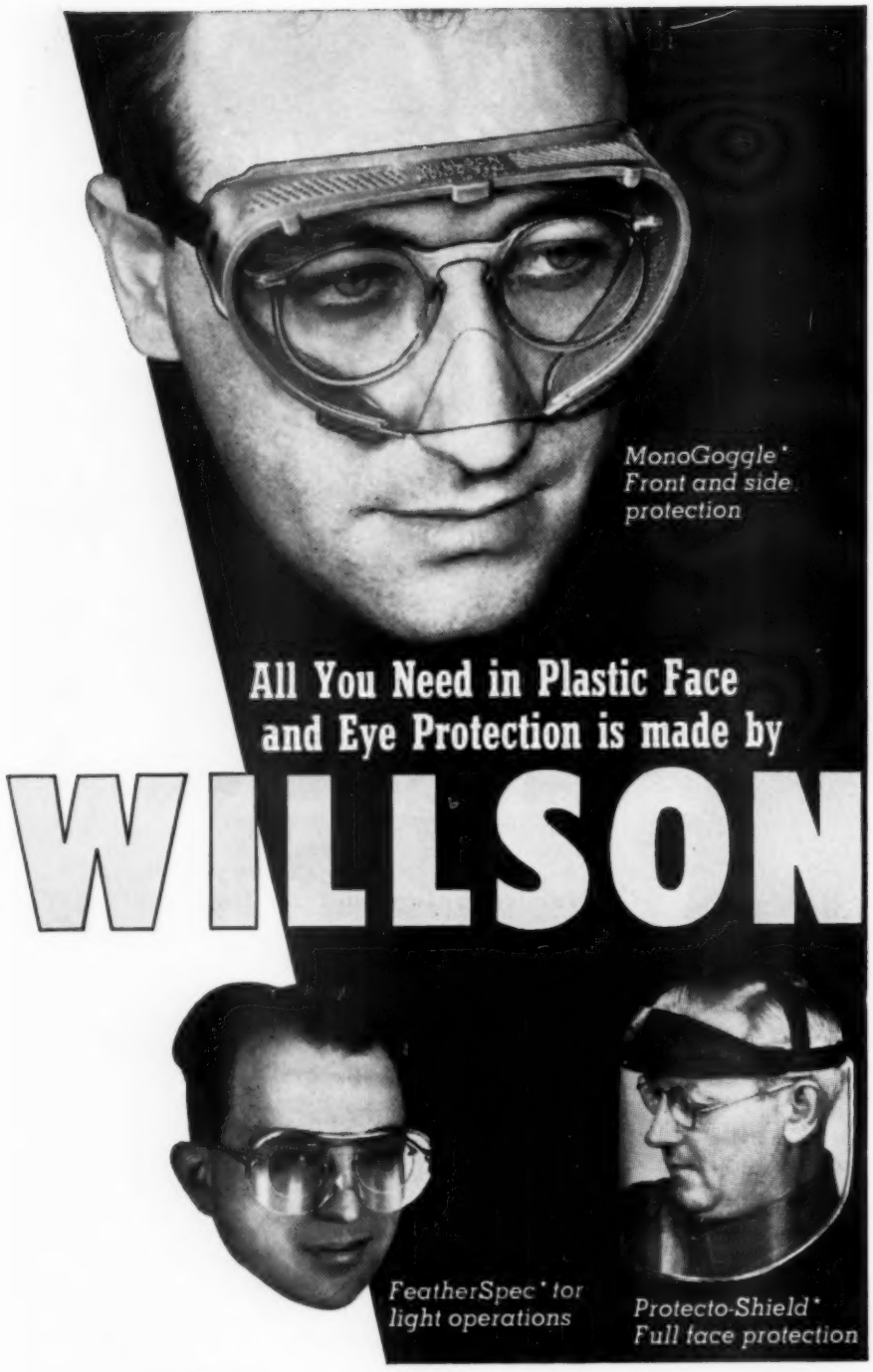

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(*Concluded from page* 158)

55	.250	191.9	178.4
	.375	199.3	185.2
	.500	204.9	190.4
	.625	208.3	193.6
	.750	210.6	195.7
	.875	210.7	195.8
	1.000	210.6	195.7
65	.250	194.5	180.8
	.375	201.3	187.1
	.500	206.2	191.7
	.625	210.0	195.2
	.750	211.3	196.4
	.875	211.6	196.7
	1.000	211.5	196.6
75	.250	196.0	182.2
	.375	202.5	188.2
	.500	208.0	193.3
	.625	211.0	196.1
	.750	212.1	197.1
	.875	212.0	197.0
	1.000	212.1	197.1

APPENDIX II

(Relative Volumes of the Screen and Regulator Coreboxes)

Net weight of the mercury required to fill the screen corebox—1883.6 grams.

Net weight of the mercury required to fill the regular corebox—1750.7 grams.

Thus, to correct the observed weights of cores produced in the screen corebox to make them directly comparable to the weights of the cores produced in the regular corebox, the weights of the former must be multiplied by a factor of $\frac{1750.7}{1883.6}$ or 0.929444.

APPENDIX III

(Sand Mixture)

15 ml of core oil was added per kilogram of sand. This is approximately equal to 80:1 by weight or 50:1 by volume.

(Sieve Analysis)

U. S. Series Equivalent Number	Amount of 50-gram Sample Retained on Sieve, Grams	Per Cent	Multiplier	Product
6	None	0.0	3	0
12	None	0.0	5	0
20	0.10	0.2	10	2
30	0.20	0.4	20	8
40	0.25	0.5	30	15
50	2.55	5.1	40	204
70	12.95	25.9	50	1,295
100	22.65	45.3	70	3,171
140	8.55	17.1	100	1,710
200	2.00	4.0	140	560
270	0.10	0.2	200	40
Pan	0.65	1.3	300	390
Total	50.00	100.0		7,395

AFS Grain Fineness Number $= \frac{7.395}{100.0} = 74.$

Editor's Note: This article is from a thesis submitted by the author in partial fulfillment of the requirements for the degree of Master of Science from the Massachusetts Institute of Technology.

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ACTIVITIES OF FOUNDRY Groups

Chicago

SHOWING of the AFS moving picture, "Fluid Flow in Transparent Molds," featured the Feb. 6 meeting of the Chicago Chapter at the Chicago Bar Association. Some 180 members and guests convened to hear S. C. Massari, technical director of the society, Chicago, narrate the film which was prepared at Battelle Memorial Institute, Columbus, O., as a research project of the society's Aluminum and Magnesium Division.

Inasmuch as the film was shown at the St. Louis convention last May and has been reviewed and referred to in various issues of THE FOUNDRY during the past eight months, a digest of its contents and the conclusions to be drawn will not be repeated here. Suffice it to say that ferrous as well as nonferrous foundrymen were impressed by the implications which the movie demonstrated in connection with the gating and risering of molds.

Chapter President W. D. McMillan, chief metallurgist, Farm Implement Division Foundries, International Harvester Co., Chicago, presided at the dinner portion of the meeting and Vice President A. W. Gregg, consulting engineer, Whiting Corp., Harvey, Ill., introduced Mr. Massari and conducted the lively discussion period which followed showing of the film.

Next meeting of the chapter will be held at the Chicago Bar Association on Mar. 6. Roundtable sessions will constitute the program—the third such type meeting for the current season.—*Erle F. Ross.*

Philadelphia

ANNUAL Christmas party of Philadelphia chapter of the AFS was attended by approximately 600 guests and members on Dec. 6 at the Benjamin Franklin Hotel, Philadelphia. The committee in charge of the party was under the chairmanship of W. J. Gallana, Rogers Brown Lavino Co., Philadelphia. Chapter chairman, William Morley, Link-Belt Co., Philadelphia, welcomed the guests and distributed numerous prizes.

Approximately 150 members and guests attended the Jan. 13 meeting of Philadelphia Chapter of the AFS held at the Engineers Club, Philadelphia.

Technical chairman of the evening, Charles Mooney, Olney Foundry Division, Link-Belt Co., Philadelphia, introduced Norman A. Birch, metallurgist, National Bearing Division, American Brake Shoe Co., Meadville, Pa. Mr. Birch's talk was a general consideration of risers, their functions and the various ways in which foundrymen can improve their effectiveness. He explained controlled directional solidification applications, the use of chills and functions of various neck-down cores, insulating material, heat generating compounds and exothermic core materials.

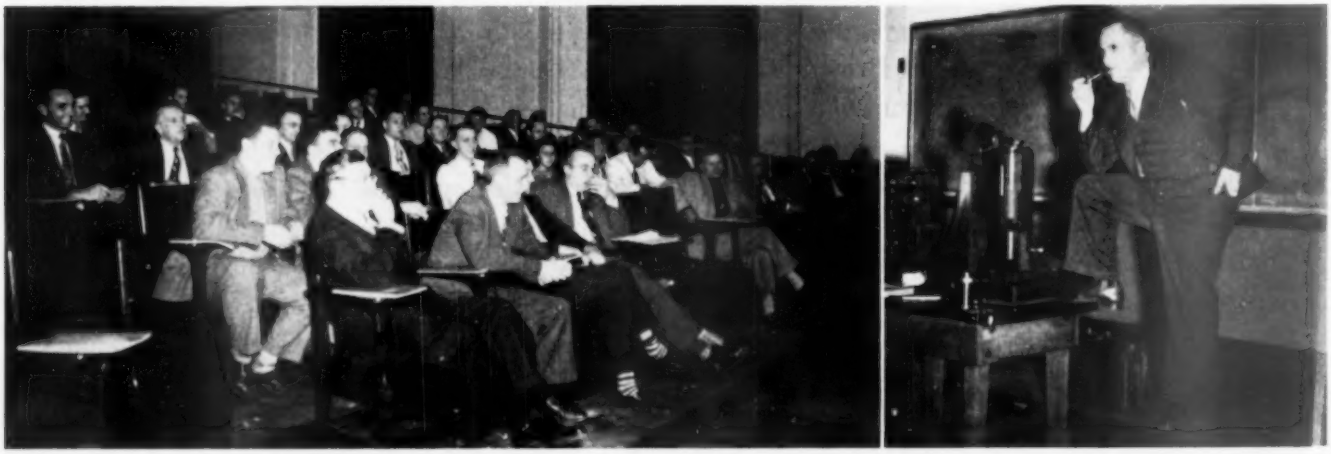
Through the courtesy of the Fanner Mfg. Co., Cleveland, a film on "Chaplets" was presented. A guest at the meeting was Fred G. Sefing, International Nickel Co., New York, a national director of the AFS.—*A. J. Saute, American Engineering Co.*

New Jersey

LATEST developments in nodular iron were discussed by Charles O. Burgess, technical director, Gray Iron Founders' Society Inc., Cleveland, at the regular monthly meeting of the New Jersey Foundrymen's Association, Military Park Hotel, Newark, N. J., Nov. 21. He touched on some phases of the manufacture of nodular iron, its major applications and possible replacements.

Campaign of the Foundry Educational Foundation for funds to continue and expand the national scholarship program of the industry was outlined by W. J. MacNeill, Dayton Malleable Iron Co., Dayton, O., who has been loaned to the foundation to help along its drive. John E. Brinton, of FEF, showed an interesting series of slides relating to the work of the organization.

(*Continued on page* 164)



PHILADELPHIA Chapter of the AFS on Nov. 9 to 11 sponsored a sand shop course conducted by Frank Brewster, Harry W. Dietert Co., Detroit. The course was held at the University of Pennsylvania and was attended by 62 people, representing 37 companies and four educational institutions

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(*Continued from page* 162)

H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J. is chairman of the district's group solicitation.

Foundry layout, material handling and various pointers for increasing mold production and manpower output were discussed by J. C. Lucas, director, management engineering division, Meehanite Metal Corp., New Rochelle, N. Y., before members of the New Jersey Foundrymen's Association at their regular monthly meeting at the Military Park Hotel, Newark, N. J., Jan. 16. He also discussed the value of flow charts and motion study as a basis for cost reduction, and the development of a standard cost system. His talk was illustrated with slides.—*B. K. Price.*

Cincinnati

EIGHTY members and guests attended the regular meeting of Cincinnati District Chapter of the AFS, held Jan. 9 at the Engineering Society Building, Cincinnati.

"Progress through Better Methods and Motion Study" was discussed by C. Braun, plant manager, Central Foundry Division, General Motors Corp. In many cases only minor changes in arrangement of equipment and tools may minimize the amount of motion of the worker so as to increase production. A demonstration was given by S. D. Martin, production manager of the Central Foundry Division, General Motors Corp., showing how a few changes in a molding bench could decrease the time required for production of cores. A motion picture followed illustrating some of the revisions made at the GMC Saginaw, Mich., plant as a result of time and motion studies.—*Prof. J. F. Kahles, University of Cincinnati.*

Northwestern Pennsylvania

TWO meetings were held by Northwestern Pennsylvania Chapter of the AFS during January. The first was at the Penn Grove Hotel, Grove City, Pa., Jan. 9. Douglas James, superintendent, Cooper-Bessemer Co., Grove City, presided as chairman with 65 present including men from Erie, Detroit, Meadville and Grove City.

William McCracken, assistant chief metallurgist of Cooper-Bessemer, introduced the speaker, William H. Moore, Meehanite Metal Corp., whose topic was "Synthetic and Natural Bonded Molding Sands." Grove City College was well represented by Dr. Clark Dawes, professor of metallurgy, and "The Harmonaires" the college quartet who were called back for

(*Continued on page* 166)

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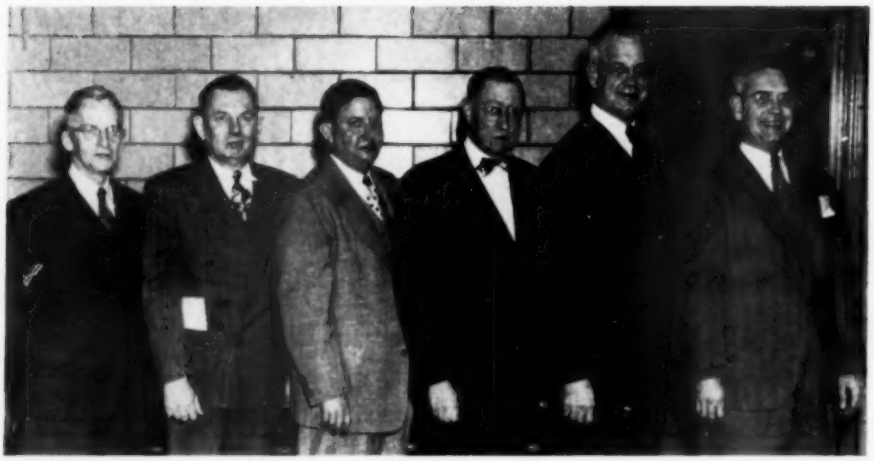

CANTON DISTRICT Chapter of the AFS celebrated past chairmen's night Jan. 5 at the Moose Club, Massillon, O. The five former chapter chairmen were awarded certificates. Shown, left to right, are: Edward H. Taylor, F. E. Myers & Bros. Co., Ashland, O., 1948-49; C. F. Bunting, Pitcairn Co., Barberton, O., 1947-48; I. M. Emery, Massillon Steel Casting Co., Massillon, 1945-46; K. F. Schmidt, United Engineering & Foundry Co., Canton, O., 1943-1945; Gordon Robertson, American Steel Foundries, Alliance, O., 1946-47, and George M. Biggert, United Engineering & Foundry Co., present chapter chairman

(*Continued from page* 164)

many encores.

At the Jan. 23 meeting at the Moose Club, Erie, the AFS movie, "Fluid Flow in Transparent Molds," was shown and narrated by Walter Bonsack, Apex Smelting Corp., Cleveland. The brief discussion period which followed was led by Jacob Diemart, Erie Castings Co. Thomas E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., a national director of the AFS, was a guest at the meeting. He reported briefly on the society's allocation of finances and also on the convention to be held in Cleveland in May.

The chapter will meet at Dunkirk, N. Y., Mar. 17 at Van Buren Bay Inn. Mark Morrison, U. S. Radiator Co., is chairman of the meeting, and Dr. Simonsen, Fredonia State Teachers College, will speak on "Actual Experiences in Labor Relations."—*Earl M. Strick, Erie Malleable Iron Co.*

CENTRAL INDIANA Chapter of the AFS heard Robert P. Schauss, Illinois Clay Products Co., Joliet, Ill., (left) speak on "Gating and Risering" at its Jan. 9 meeting, in the Athenaeum, Indianapolis. Edward Spahr, National Malleable & Steel Castings Co., Indianapolis, (right) was technical chairman at the meeting. Photo courtesy Henry Yeager, International Harvester Co.

Central Indiana

APPROXIMATELY 115 members and guests of Central Indiana Chapter of the AFS were present Jan. 9 at the Athenaeum, Indianapolis, to hear Robert P. Schauss, foundry engineer, Illinois Clay Products Co., Joliet, Ill., talk on "Gating and Risering."

Mr. Schauss emphasized the importance of correct risers in all types of castings. In order to obtain peak efficiency it is important that hot metal enter all the feeders and risers. In Mr. Schauss' opinion, open feeders are less efficient than closed feeders, and he maintained that the important point is the connection between the feeder and the casting cavity. He explained the principle of the Williams riser which is an aid in keeping the feeder open. Mr. Schauss illustrated the talk with slides and a question-and-answer period completed the presentation.

Edward Spahr, National Malleable & Steel Castings Co., Indianapolis, served as technical chairman for the meeting.—*W. K. Mitchell, L. W. & W. K. Mitchell Co.*

Canton

CERTIFICATES in recognition of their service to the chapter were awarded to the five past chairmen of Canton District Chapter of the AFS at its regular meeting held Jan. 5 at the Moose Club, Massillon, O. Presentation was made by Chairman George M. Biggert, United Engineering & Foundry Co., Canton, O., to: K. G. Schmidt, United Engineering & Foundry Co., Canton, who was chairman from 1943-45; I. M. Emery, Massillon Steel Casting Co., Massillon, 1945-46; Gordon Robertson, American Steel Foundries, Alliance, O., 1946-47; C. F. Bunting, Pitcairn Co., Barberton, O., 1947-48; and Edward H. Taylor, F. E. Myers & Bros. Co., Ashland, O., 1948-49.

Vice Chairman Thomas W. Harvey of the Pittsburgh Valve & Fitting Div., Pitcairn Co., Barberton, introduced Edward McFaul, Midwest Institute, Chicago, whose talk was entitled "What Is Your Wash Room Rating?" It dealt with personnel relationships between supervisors, foremen and workers.

Three national officers of the AFS met with the chapter's directors at the board meeting, and were also present for the chapter meeting in the evening. They were William W. Maloney, secretary-treasurer, AFS, Chicago; Walton L. Woody, National Malleable & Steel Castings Co., Cleveland, vice president, and Vincent J. Sedlon, Master Pattern Co., Cleveland,

(*Continued on page* 169)

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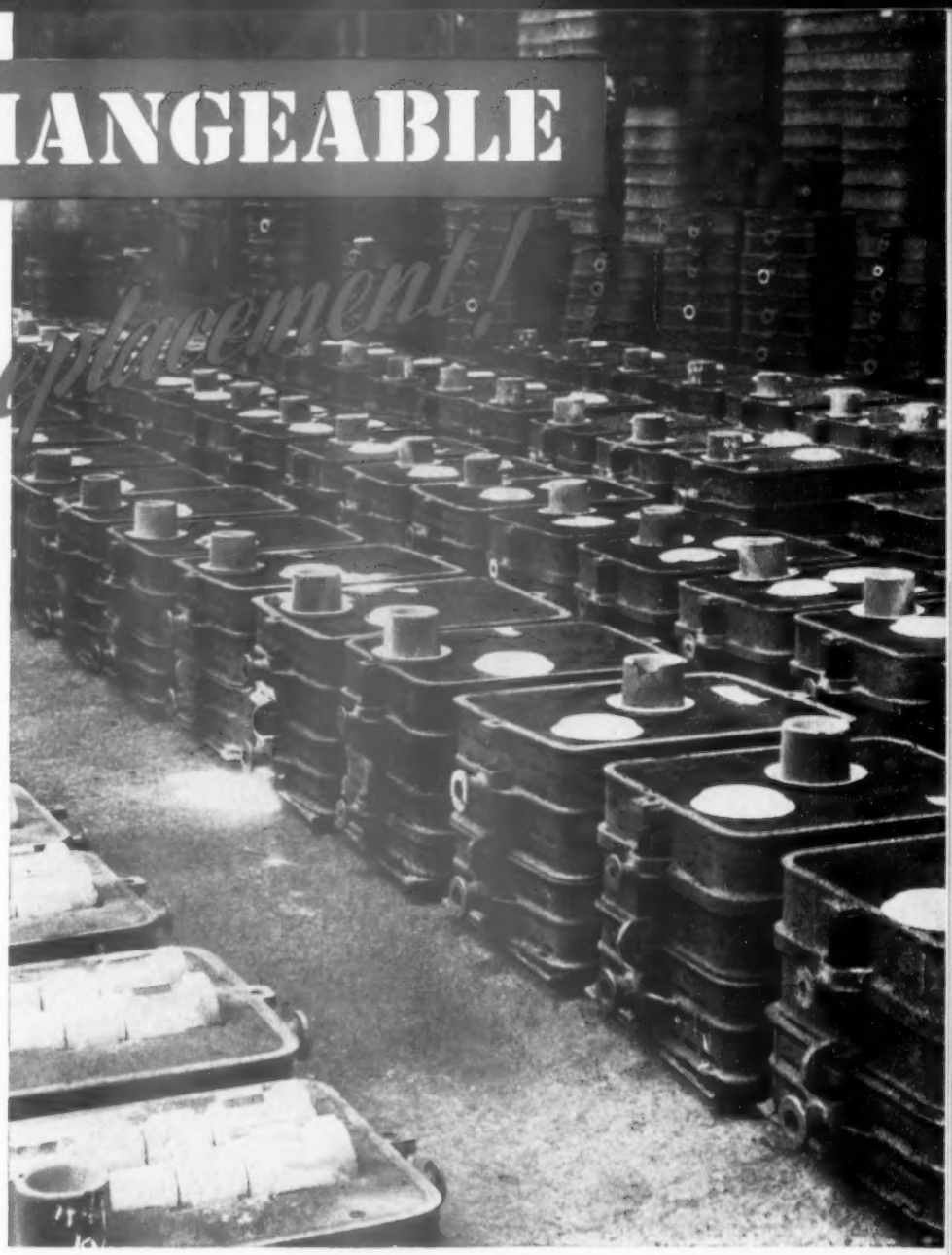

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Mexaloy is extremely easy to apply. Mixed with clay, ground fire brick and water according to a simple formula, the resulting mixture is easily applied by tamping. Linings containing Mexaloy last longer. For example, in the spouts of open Hearth furnaces where the usual loom layer has to be replaced after every one or two heats Mexaloy linings invariably last more than 10 heats—sometimes as many as 30. In Foundry cupolas Mexaloy linings last longer and improve metal quality.

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DIVISION OF THE WICKES CORPORATION

(*Continued from page* 166)

director. The chapter was also pleased to have as its guest F. C. Biggert, chairman of the board, United Engineering & Foundry Co., Pittsburgh, whose son is presently serving as chapter chairman.—*Alexander Prentice, Stark Foundry Co.*

Texas

THE film, "Fluid Flow in Transparent Molds," was shown to 60 members and guests of Texas Chapter of the AFS at its meeting Jan. 20 at the Blackstone Hotel, Ft. Worth, Tex. S. C. Massari, technical director of the AFS presented the commentary on the film.

Special guest at the meeting was W. H. McFadden, who served as president of the American Foundrymen's Society in 1906-07.—*E. P. Clarke, American Wheelabrator & Equipment Co.*

TEXAS Chapter of the AFS met Jan. 20 at the Blackstone Hotel, Fort Worth, Tex. Shown above at the meeting, left to right, are: John Bird, American Brass Foundry, Fort Worth; W. H. Lynne III, Hughes Tool Co., Houston, Tex.; S. C. Massari, technical director, AFS, and principal speaker at the meeting; C. H. McGrail, Texaloy Foundry Co., San Antonio, Tex.; Thurman Killman, Texas Steel Co., Forth Worth, and W. H. McFadden, past president, national AFS (1906-07). Photo by courtesy of Texas Electric Steel Casting Co.

Northeastern Ohio

TWO films were shown at the Jan. 12 meeting of Northeastern Ohio Chapter of the AFS at Tudor Arms Hotel, Cleveland. In place of the usual coffee speaker a sound film produced by Fanner Mfg. Co., Cleveland, was shown. The film has an interesting and well-presented commentary on the purpose and applications of chaplets in the manufacture of castings. It pictures operations in the automotive, locomotive, radiator and boiler industries.

The AFS Aluminum and Magnesium Division film, "Fluid Flow in Transparent Molds," was shown at the technical session. Walter E. Sicha, chief of the Cleveland Research Division, Aluminum Co. of America, gave the commentary on the picture. The film shows flow phenomena of water, containing aluminum powder, in transparent plastic molds. It is a progress report on a study of gating started in 1946.

In brief, the study showed that a pouring box should be employed in pouring molds, and the liquid level in the box should be kept sufficiently high to avoid formation of a vortex in the sprue. The opening from the box to the sprue should be rounded. The sprue should be tapered with the largest cross-sectional area at the top, and the base of the sprue should be rounded. A wedge should be employed in the runner at the base of the sprue to divide the liquid stream into the runners. Cross-sectional area of the runners should increase gradually away from the sprue. Square corners and abrupt changes in direction should be avoided in the entire system of gates and runners.

The patternmaking group of Northeastern Ohio Chapter of the AFS was in charge of the technical meeting held Feb. 9 at Tudor Arms Hotel, Cleveland. Albert F. Pfeiffer, Pattern & Foundry Division, Allis-Chalmers Mfg. Co., Milwaukee, spoke on "Patternmaking in Foundry Work."

Mr. Pfeiffer advocated that, when a new piece of pattern equipment is to be developed, a model of that equipment be made in addition to the drawing. The patternmaker, foundryman and engineer then should meet to discuss the model and decide upon

(*Continued on page* 172)

NORTHEASTERN OHIO Chapter of the AFS held its regular monthly technical meeting Jan. 12 at Tudor Arms Hotel, Cleveland. Principal speaker at the meeting was Walter E. Sicha, chief of the Cleveland Research Division, Aluminum Co. of America, and chairman of the Aluminum and Magnesium Division of the AFS. Photos are by courtesy of Sterling N. Farmer, Sand Products Corp.

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SPEEDMULLORS

Completely Mull and Cool Molding Sand!

Thoroughly Mull Core Sand!

1½ Minute Total Batch Cycles!

This Model "50" Speedmullor supplies all of the molding sand required in ramming large molds. Although the mullor has a rated batch capacity of 7½ cubic feet, it thoroughly mulls and simultaneously cools 10 cubic foot batches of all-purpose sand in 1½ minute total cycles.

This Speedmullor not only prepares all of the core sand required in the foundry but also supplies all of the molding sand used by a battery of eight jolt squeeze machines. Also a Model "50," it thoroughly mulls each batch of sand during a total cycle of only 1½ minutes.

Increased large core production and reduced core-making cost . . . that's the result with a Stationary Sandslinger in Standard's core room. This "slinger," served by a flexible arrangement of roller conveyors and transfer cars, facilitates continuous, highly efficient core-making. Manual operations in core ramming have been eliminated and crane work has been greatly reduced.

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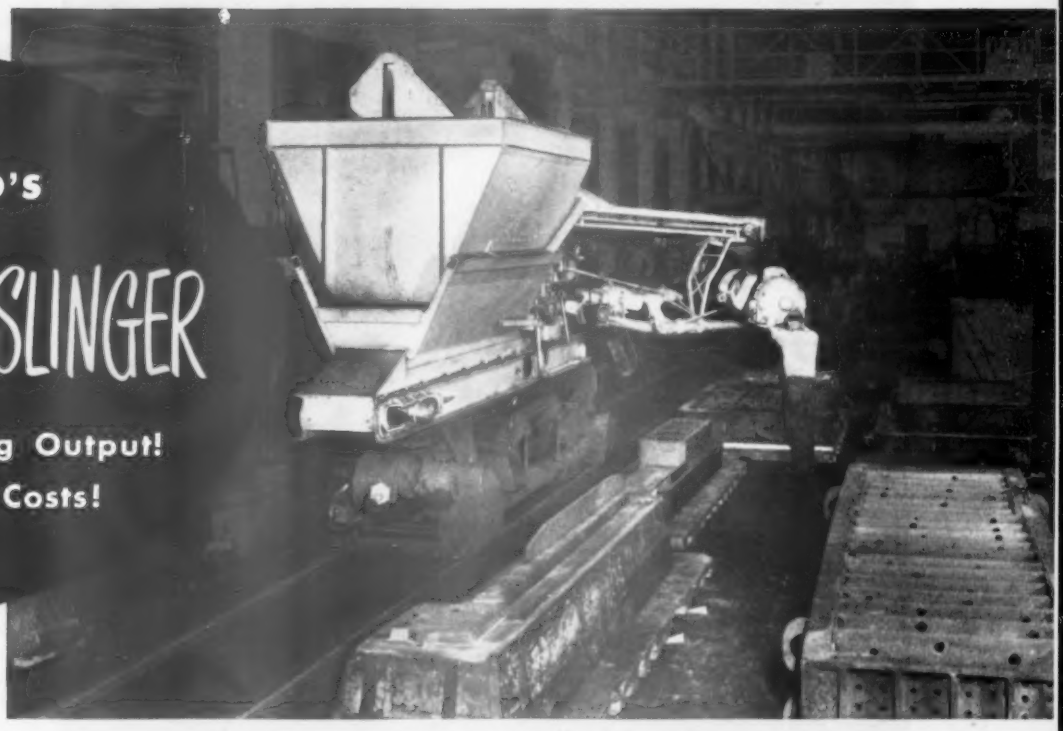

Jobs placed in production on this floor will be produced in the least expensive, yet most efficient manner, assuring Standard's customers every advantage of a well planned production set-up which retains jobbing foundry flexibility. The Motive Sandslinger rams these molds, varying in size from 3′ x 3′ to 4′ x 14′ and 8′ x 8′ in *minimum time* and at *minimum cost*. The ramming hardness and uniformity attained has enabled this foundry to simplify and standardize flask equipment and virtually eliminate the use of gaggers and bottom boards.

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Ask for descriptive literature on *Motive Sandslingers!*
Ask for *facts* . . . mulling graphs and charts on *Speedmullor* operation!
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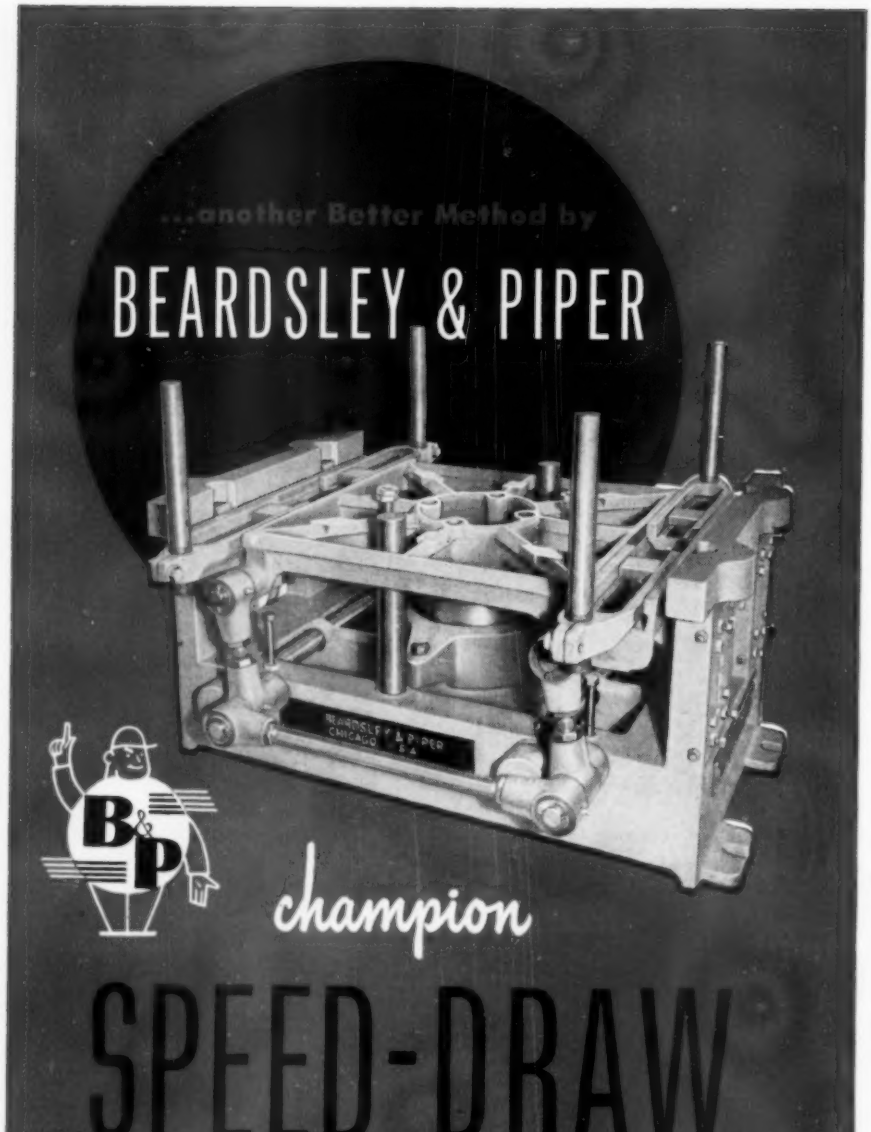

The air operated, Champion Speed-Draw lifts either cope or drag mold quickly, smoothly, and economically. Pattern mounting is simplified and pattern changes are made with a minimum of interruption to production.

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(*Continued from page* 169)

any changes before the actual pattern is made.

He went on to say that records should be kept on the performance and use of all patterns. Such records form a reference file for future pattern alterations or changes in design. With regard to experimental work, he cautioned that the patterns used must not be haphazardly thrown together because a producton job is going to be developed from the experimental work.

A practical, production-increasing idea applicable to matchplate work was suggested by Mr. Pfeiffer. When a particular job calls for the pattern to be mounted on only one side of the matchplate and the mold cavity to be only in the drag, his company often mounts patterns on both sides of the plate so that mold cavities can be made in the cope as well. A split core is used between the cope and drag.

Peter Rettig, Rettig Pattern Co., Cleveland, announced that the patternmakers group would hold a special meeting at the Tudor Arms, Mar. 9. He invited all foundrymen. The Ohio Regional Foundry Conference at Cincinnati will replace the regular March chapter meeting.—*Robert H. Herrmann.*

Chesapeake

THIRD annual oyster roast was held in December by Chesapeake Chapter of the AFS at the Alcazar in Baltimore. Three hundred members and guests attended. Included on the menu were raw oysters and clams, oyster stew, oyster fritters, fried oysters, roast beef, steamed frankfurters in sauerkraut and coffee. Enjoyed also were visiting, singing and card games. — *Jack H. Schaum, National Bureau of Standards*

New England

FIFTY-FOURTH annual meeting of the New England Foundrymen's Association was held Jan. 11 at the Parker House, Boston, with about 250 members and guests present. An excellent dinner was followed by a floor show arranged by Harry Impey and his committee.

Officers elected are: President, Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass.; vice president, Robert C. Walker, Whitin Machine Co., Whitinsville, Mass.; treasurer, Arthur W. Gibby, East Boston, Mass.; secretary, Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.

Elected to the executive committee were: Frank R. Elliot, Westinghouse

Electric Corp., Springfield, Mass.; Joseph B. Stazinski, General Electric Co., Lynn, Mass.; Gordon L. Paul, Brown & Sharpe Mfg. Co., Providence, R. I.; Henry G. Stenberg, Draper Corp., Hopedale, Mass.; Charles A. Reed, Cambridge.—*Walter M. Saunders*

Ontario

GROUP discussions featured the Nov. 18 meeting of Ontario Chapter of the AFS, held at the Royal Connaught Hotel, Hamilton, Ont. Chairman J. H. King, Werner G. Smith Ltd., Toronto, Ont., presided, and after dinner the meeting divided into two groups for technical discussions. The nonferrous group met with William Currie, Galt Brass Co. Ltd., Galt, Ont., as chairman.

Benton Dixon, Dominion Wheel & Foundries Ltd., Toronto, was chairman of the ferrous group. Discussion leaders were Burnie Morris, Gurney Foundry, Toronto, and Ernest Moss, Hamilton Foundry Co., Hamilton, Ont. Two films, on chaplets and chills and their applications, were shown through the courtesy of the Canadian Fanner Co., Hamilton. The discussion was principally on chaplets and their stem sizes in relation to metal sections to insure fusion and to prevent leaking castings. — *C. H. Johnston, E. Long Ltd.*

Central Michigan

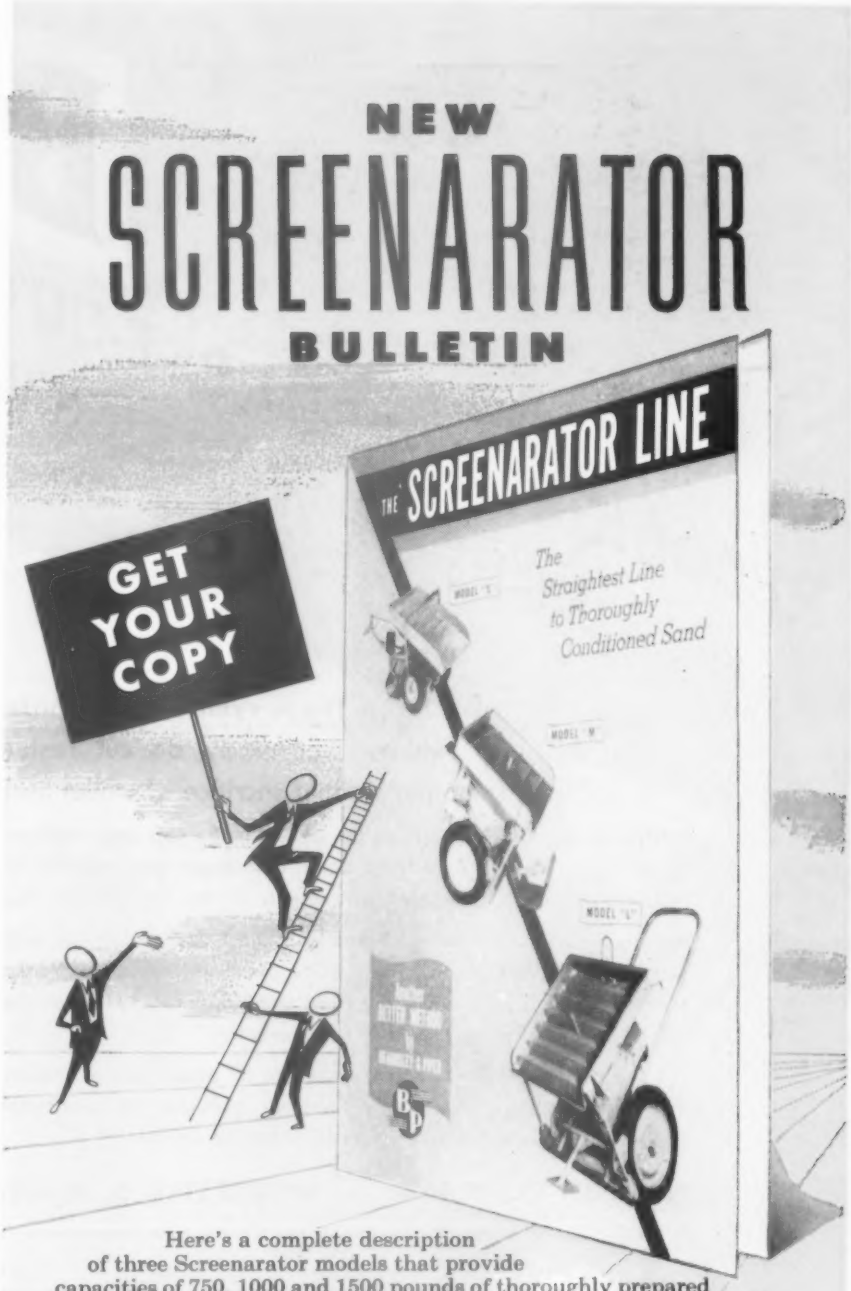
SIXTY members and guests were present at the Central Michigan Chapter of the AFS meeting held Jan. 18 at the American Legion Clubhouse, Battle Creek, Mich. Guest speaker was Bernard P. Mulcahy, president, Fuel Research Laboratory Inc., Indianapolis, who spoke on "Cupola Operations and Foundry Coke."

Mr. Mulcahy began his talk by discussing the three types of coke produced: Blast furnace, foundry and that for general heating. Of these, foundry coke is the most difficult to produce. Referring to the cupola, Mr. Mulcahy stated the cupola is simple in design and yet has a high thermal efficiency. The principal dimensions are its diameter, which determines the output capacity, and its height, which affects its thermal efficiency.

Raw materials used and method of charging have a great effect on cupola operation. Scrap should be as uniform in composition as possible and should not vary from one carload to another. Important characteristic of coke is its size, which determines the rate of combustion and also the rate at which it will discharge gases through the cupola.

The speaker pointed out that air

(*Continued on page* 175)



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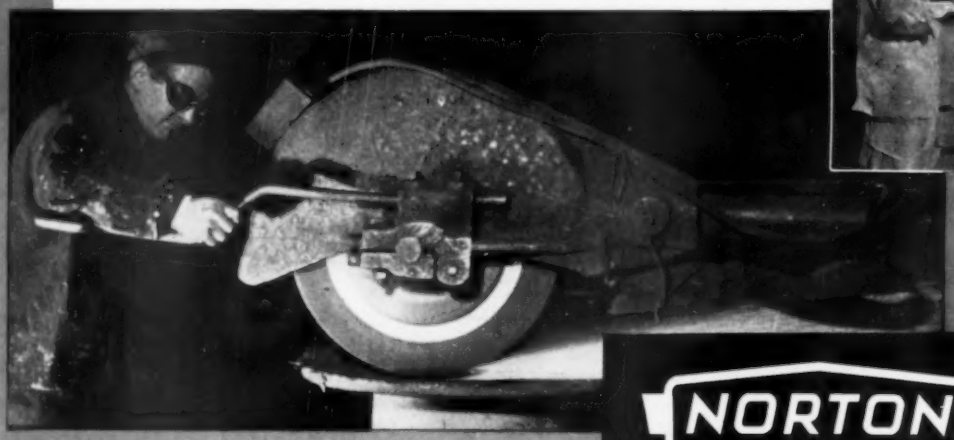

NORTON ABRASIVES

Making better products to make other products better

BIRMINGHAM DISTRICT Chapter of the AFS at its January meeting had as guest speaker J. A. Wickett, Monsanto Chemical Co., Chicago. At the speakers' table, above, left to right, are: Morris Hawkins, Stockham Valves & Fittings, chapter vice chairman; Mr. Wickett; C. P. Caldwell, Caldwell Foundry & Machine Co., chapter chairman; B. W. Worthington, McWane Cast Iron Pipe Co., director; J. A. Bowers, American Cast Iron Pipe Co., director, and D. C. McMahen, Harbison-Walker Refractories Co., director, all of Birmingham

Birmingham

APPLICATION of Synthetic Resin Binders in the Core Room," was the title of the talk presented by J. A. Wickett, Plastics Division, Monsanto Chemical Co., Chicago, at the Birmingham District Chapter of the AFS meeting in January. Morris Hawkins, Stockham Valves & Fittings Inc., Birmingham, introduced the speaker. The University of Alabama announced it would welcome the attendance of all foundrymen for the pouring of the first heat of iron in the university's new foundry on Jan. 31.—*J. P. McClendon, Stockham Valves & Fittings Inc.*

Eastern New York

THE Jan. 17 meeting of Eastern New York Chapter of the AFS, held at Circle Inn, Lathams, N. Y., featured one of its members, Prof. James S. Campbell Jr., Rensselaer Polytechnic Institute, Troy, N. Y., who spoke on "Education for the Foundry Industry."

Professor Campbell described what is being done at Rensselaer to in-

(*Continued from page* 173)

is the only raw material over which complete control can be exercised. He recommended hot blast, if economically feasible, over cold blast. Dry blast also should be used since wet air affects operations.

Don Gilchrist, Homer Furnace & Foundry Corp., Coldwater, Mich., served as technical chairman.

Fitz Coghlin Jr., Albion Malleable Iron Co., chapter chairman, announced the appointment of Mr. Gilchrist to serve the remainder of J. W. Durr's term as director. Mr. Durr has transferred his membership to the Northwestern Pennsylvania Chapter. Mr. Coghlin also announced the start of the 1950 educational program which featured a visit to the Albion Malleable Iron Co. plant, Albion, Mich., on Feb. 2 as its first project. Jack F. Secor, Hill & Griffith Co., Niles, Mich., is chairman of the educational committee.—*F. P. Tobakos, Albion Malleable Iron Co.*

Saginaw Valley

COREROOM sands was the topic considered at the Jan. 5 meeting of Saginaw Valley Chapter of the AFS. Meeting was held at the Fischer Hotel, Frankenmuth, Mich., with 200 members and guests present. Immediately following dinner, a colored motion picture, "Fishing in Alaska" was presented through the courtesy of the Marshall Auto Co., Flint, Mich. Principal speaker, Harry W. Dietert, Harry W. Dietert Co., Detroit, discussed "Application of Sands in the Coreroom," which he illustrated with pictures and slides.

Mr. Dietert included a discussion of the benefits of laboratory testing for improving cores both in the coreroom and in their use in the foundry. The discussion which followed Mr. Dietert's presentation was under the direction of Roy Foster, Bay City Foundry Co., Bay City, Mich.—*Kenneth H. Priestley, Vassar Electroloy Products.*

SAGINAW VALLEY Chapter of the AFS met at the Fischer Hotel, Frankenmuth, Mich., Jan. 5. In upper view, left to right, are: Harry W. Dietert, Harry W. Dietert Co., Detroit, principal speaker; Roy Foster, Bay City Foundry Co., Bay City, Mich., technical chairman, and Lyle L. Clark, Buick Motor Division, General Motors Corp., Flint, Mich., chapter chairman. A general view of the group, taken during the dinner, is shown at the bottom

SOUTHERN CALIFORNIA Chapter of the AFS met Jan. 13 to hear Frank G. Steinebach, editor, *The Foundry*, speak. Shown, left to right, are: Mr. Steinebach; John E. Wilson, Climax Molybdenum Co., Los Angeles, chapter vice president, and Robert Gregg, Reliance Regulator Corp., Alhambra, Calif., national AFS director. Photo by Henry E. Russill, Eld Metal Co.

terest and educate students in the foundry industry and discussed some of the problems they have encountered. He also presented an interesting movie which is used in the training of students. During the discussion period, many local foundries offered assistance to the institute's educational program. — *George E. Danner, American Locomotive Co.*

Southern California

CONSIDERATION of "What's Ahead in the Foundry Industry" featured the Jan. 13 meeting of Southern California Chapter of the AFS held at Rodger Young Auditorium in Los Angeles.

The speaker, Frank G. Steinebach, editor, THE FOUNDRY, pointed out that during the war, government agencies had shown a preference for steel. Steps have since been taken by the government to set up a foundry industry advisory committee to the Munitions Board with members representing all branches of the industry and coming from all sections of the country.

Mr. Steinebach stated that the postwar period has seen the industry's greatest development due to progress made in modernization and mechanization. The educational program of the Foundry Educational Foundation to get more college men into the industry also was cited for its progress.

As additional steps to further this advancement Mr. Steinebach suggested: Better production and cost methods; elimination of waste; making the foundry a better place in which to work; use of technical research information; and a more active sales program.

Preceding the talk, the films "Atomic Bomb Test—Bikini Island" and "Operation Crossroads" were shown through courtesy of the U. S. Navy.

Harry W. Dietert, Harry W. Dietert Co., Detroit, is presenting to the chapter membership Mar. 13-16, a series of lectures on "Sand Control." —*W. G. Stenberg, U. S. Electrical Motors Inc.*

QUAD CITY Chapter of the AFS heard Thomas Muff, Sorbo-Mat Process Engineers, St. Louis, discuss gates and risers at its Jan. 16 meeting. The accompanying photo shows, front row, left to right: L. C. Farquhar, national director of the AFS, and Mr. Muff. Back row, left to right, are: E. P. Closen, John Deere Planter Works, Moline, Ill., chapter chairman, and Harold A. Rasmussen, General Pattern Corp., Moline, chapter vice chairman

Quad-City

A SCIENTIFIC approach to the problem of gates and risers was presented by Thomas C. Muff, Sorbo-Mat Process Engineers, St. Louis, at the Jan. 16 meeting of Quad-City Chapter of the AFS. There were 150 members present.

Mr. Muff stated that sand, iron, design, cores and molding practice all can cause shrinks. Sand with low hot strength or molds rammed soft tend to increase shrinkage. Improper design creates hot spots. The speaker emphasized one simple rule. Solidification in a casting should progress from thin sections to thick, and gating should be at the heavy section. Riser size and weight can be computed through formulas. Mr. Muff mentioned that in most cases gating is through the riser. Spin gates are used with a drag bob to give an initial swirling action.

The coffee talk was by Carl Gamble, a local amateur astronomer, who talked on "Our Solar System."—*R. E. Miller, John Deere Planter Works.*

Ohio State

STEP gating and finger gating were illustrated in two U. S. Naval Research Laboratory films shown at the Jan. 10 meeting of Ohio State University Chapter of the AFS held in the Industry Engineering Building of the university.

The first film covered step gating of a vertically cast ingot. Cross-sectional areas of sprues and gates were varied, the angles at which the gates entered the mold were changed, and the bottom ends of the sprues were widened or narrowed to provide a study of the effect of the different combinations on turbulence and successive feeding of the step gates.

A similar study of finger gating was shown in the second film. The films revealed that conventional methods of step gating and finger gating could be revised to provide a better controlled flow of metal.

Contributing to the discussion which

(*Continued on page* 179)

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- 500,000 in use, no failures
- Last up to 3 times longer
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- Better heat transfer
- AMERA-MAG- is certified

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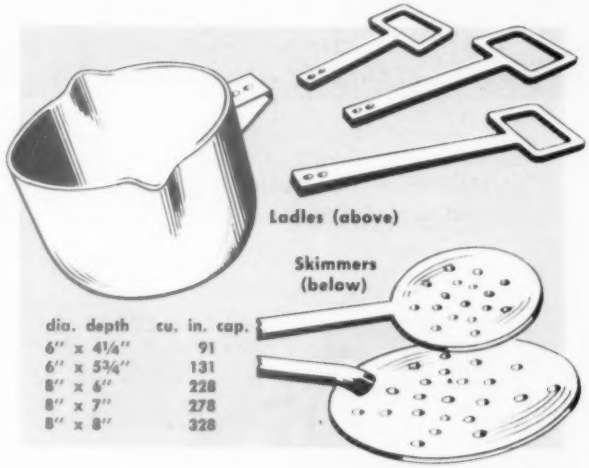
Latest triumph of metallurgy—tough, fine-grained AMERA-MAG steel has qualities that make it best news for magnesium foundrymen in years!

AMERA-MAG Crucibles—Designed for magnesium. No copper, nickel contamination. Formed and welded—lighter, easier handling, yet safer and longer lasting. Resist thermal shock, high-heat and distortion. No cracks or leaks. Retard scaling. Tested, proven vastly superior to cast crucibles, **yet cost no more.**

AMERA-MAG Ladles—Have interchangeable handles. Durable, pressed steel construction—deep drawn to avoid spilling. Spouts designed for proper pouring. Lightweight—less operator fatigue. Spherical bottom reduces metal adherance—easy to clean.

AMERA-MAG Skimmers—Order now for early delivery with your new AMERA-MAG crucibles and ladles. For complete information, write or wire . . .



dia.	depth	cu. in. cap.
6"	x 4¼"	91
6"	x 5¾"	131
8"	x 6"	228
8"	x 7"	278
8"	x 8"	328

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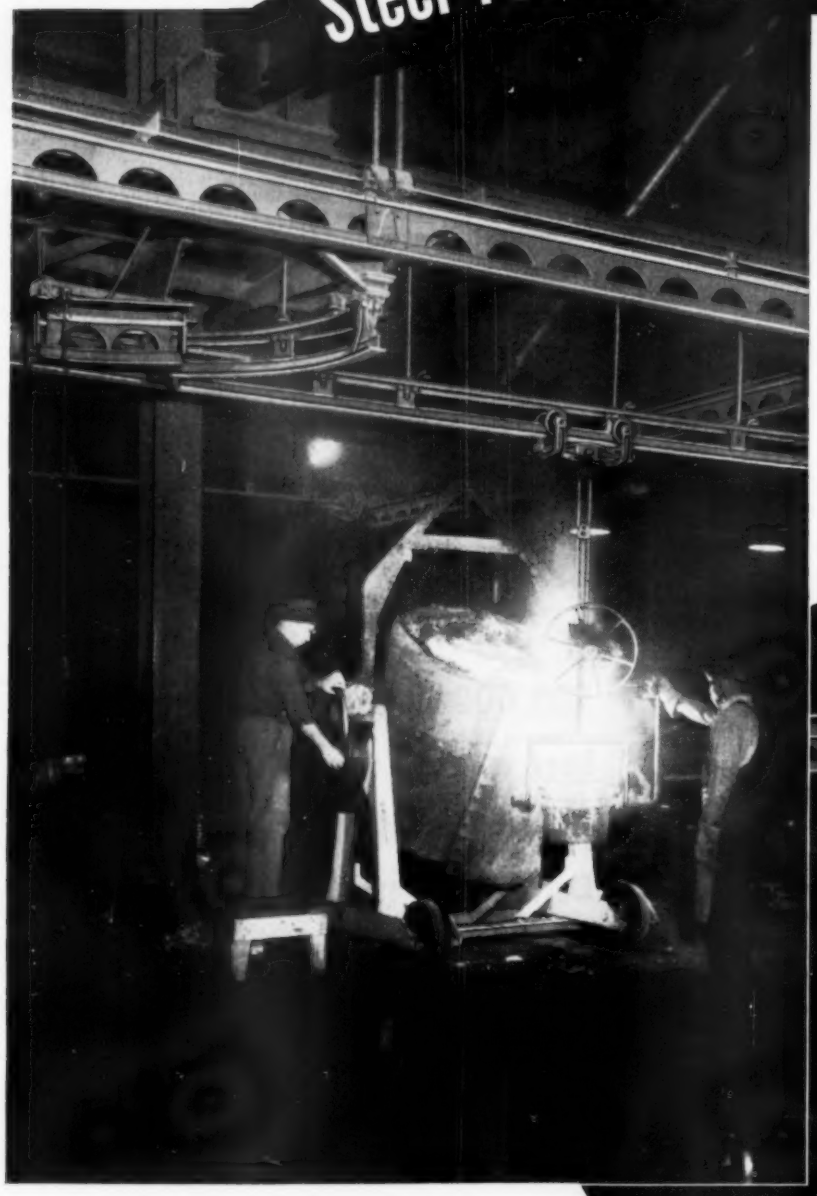

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

(*Continued from page* 176)

followed were five guests from the Buckeye Steel Castings Co., Columbus, O.: W. W. Heimberger, works manager; Frank Hauck, superintendent; Harry Glen, chief inspector; Richard McClaine, core room foreman; Sam Daugherty, open hearth supervisor.

New members were introduced during the business session. The chapter now has 33 members. — *Dallas M. Marsh.*

Cleveland Non-Ferrous

CLEVELAND Chapter of the Non-Ferrous Founders' Society met at the Cleveland Athletic Club, Jan. 26. Frank Gates, Gates Service Co., Columbus, O., was the principal speaker. His company specializes in employer advisory service regarding unemployment and workmen's compensation claims against the Ohio Industrial Commission, Columbus.

He confined his talk to a discussion of workmen's compensation, pointing out the provisions of the law and describing how the actuarial rates charged industrial firms are set up. He urged employers to keep more complete and accurate records on the health of their employees and on the accidents they may sustain. He also suggested that employers take a more active interest in the hearings conducted by the commission on employee claims.

The meeting ended with the showing of a film on one of the Cleveland Browns—Buffalo Bills professional football games.—*Robert H. Herrmann.*

Metropolitan

CARE and maintenance of foundry equipment was the subject of a panel discussion at the Nov. 7 meeting of Metropolitan Chapter of the AFS at the Essex House, Newark, N. J. First speaker introduced by D. W. Talbott, Cooper Alloy Foundry Co., Hillside, N. J., who served as technical chairman, was George B. Comfort, Schramm Inc., West Chester, Pa. Mr. Comfort discussed "Compressors and Compressed Air in Foundries." He stressed the importance of proper installation and maintenance of compressed air equipment in order to give long lasting and economical service under the adverse conditions which they generally operate in the industry.

Raymond J. Shire, Tabor Mfg. Co., Philadelphia, next described the vital parts of various types of molding machines and the maintenance problems involved in keeping the machines in proper working order.

Concluding speaker was A. L. Gardner, Pangborn Corp., Hagerstown, Md., who gave a chalk-talk on the history of cleaning castings from the earliest use of the hammer and chisel to the development of modern blasting and dust collecting systems used in many foundries.

Round-table discussions were held by members of Metropolitan Chapter at the Jan. 9 meeting held at the Essex House, Newark, N. J.

C. J. Jernstrom, Cooper Alloy Foundry Co., Hillside, N. J. served as discussion leader for the steel group; B. A. Miller, foundry superintendent, Baldwin Locomotive Co., Eddystone, Pa., led the discussion for the brass and bronze foundrymen; C. L. Lane, Florence Pipe Foundry & Machine Co., Florence, N. J., presided at the gray iron meeting, and R. E. Ward, Eclipse-Pioneer Foundries Division, Bendix Aviation Corp., Teterboro, N. J., was discussion leader for those interested in light metals.—*John Bing, Metropolitan Refractories Corp. and Carl Szego, Moldcast Products Inc.*

Pittsburgh

T. E. EGAN, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa., discussed "Practical Evaluation of Ductile Cast Iron" at the Jan. 16 meeting of the Pittsburgh Foundrymen's Association, held at the Fort Pitt Hotel, Pittsburgh. Mr. Egan stated that his company was one of the first foundries to go into the production of ductile or nodular cast iron and has done much exploratory work with this unique material.

He cited results of a number of operating characteristics of the nodular iron in service today. Extreme emphasis should be directed toward exact technical control of all metallurgical and melting processes if satisfactory results are to be obtained, according to Mr. Egan.—*Joseph C. Sullivan.*

No. Illinois - So. Wisconsin

AT the Jan. 10 meeting of Northern Illinois-Southern Wisconsin Chapter of the AFS, Harry Jacobson, Industrial Pattern Works, Chicago, spoke on "Patterns and Coreboxes, the Key to Quality Castings."

Mr. Jacobson suggested that pattern dimensions be classed as functional dimensions and product dimensions. Product dimensions refer to all casting dimensions that are necessary to meet specifications. These are laid out by the design engineer. Functional dimensions refer to dimensions of all equipment and accessories needed to produce the casting such as core prints, crush strips, gates and runners, etc. These dimensions would be laid out by the pattern specialist. Thus by having the dimensions established by the specialist in each category, it would be possible to produce castings that are accurate dimensionwise and at reasonable cost; factors which are important from the competitive viewpoint.

It was announced that the chapter is sponsoring 13 entrants in the AFS national apprenticeship contest. Special guests were L. C. Farquhar Sr., American Steel Foundries, East St. Louis, Ill., and a national director of the AFS. Also Mr. Illineck,

(*Continued on page* 182)

METROPOLITAN Chapter of the AFS held four roundtable discussions at its meeting Jan. 9 at the Essex House, Newark, N. J. At right in Fig. 1 is R. E. Ward, Eclipse-Pioneer Foundries Division, Bendix Aviation Corp., Teterboro, N. J., discussion leader at the light metals session. Fig. 2—C. J. Jernstrom, Cooper Alloy Foundry Co., Hillside, N. J., steel. Fig. 3, left to right at the brass and bronze session: Discussion Leader B. A. Miller, Baldwin Locomotive Co., Eddystone, Pa.; George Bradshaw, Philadelphia Navy Base, and E. Miller, Bethlehem Steel Foundry, Staten Island, N. Y. Fig. 4—C. L. Lane, Florence Pipe Foundry & Machine Co., Florence, N. J., gray iron

. . . if you sell it to the foundries

54th ANNUAL FOUNDRY CONVENTION and EXHIBITION in CLEVELAND - MAY 8-12

The coming gathering of the foundry "clan" promises to set new highs in attendance —and, more important, interest in new machinery and equipment, improved materials and supplies.

That interest has been generated by the general improvement in the demand for castings during the past few months and by the need for a continued drive for lower production costs. Foundrymen look for many more months of rising demand. In fact, an independent study of trends, over the next ten years, provides a sound basis for estimating that the record production of 16,000,000 tons of castings produced in 1948 will be exceeded many times before 1960.

Small wonder that foundrymen are on the hunt for machinery and equipment that will provide more efficient and economical operation, increase production of castings and improve their quality.

On top of that, speeded up operations in the foundries will accelerate wear and obsolescence, creating a replacement market of ample proportions.

If you intend to exhibit at the coming show, well and good. But whether or not, you will be sure of getting an attentive and receptive audience of 35,000 foundrymen for your sales messages in THE FOUNDRY. It reaches all those in key positions—executive, production and technical—who have a hand in purchasing foundry equipment, materials and supplies.

Two Outstanding Issues of THE FOUNDRY Devoted to Convention and Show Activities

The Pre-Convention Issue for May

This great issue of THE FOUNDRY will preview the convention, giving the highlights of this important week and a complete program of the show and technical sessions. This will be in addition to the regular features and technical articles—making the issue doubly valuable to foundrymen. It will be published well in advance of the opening of the convention. If you are exhibiting, make them want to see your new developments at the show. If not, you can't afford to miss this opportunity of showing your wares in THE FOUNDRY which will be distributed at the show.

Forms Close for May Issue on April 1st.

The Post-Convention Issue for June

Another great issue which will contain, in addition to the regular editorial matter, a comprehensive and interesting story of the convention and show. It will interpret what happened in terms of benefits to all foundrymen whether or not they attended the show. It will be a grand opportunity for you to cash in on the foundrymen's interest in what advances in their industry have been made and what are planned. With their enthusiasm whipped up, they'll be ready to buy. Make sure your products are on the preferred list by using THE FOUNDRY Post-Convention Issue.

Forms close for June Issue on May 1st.

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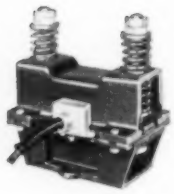

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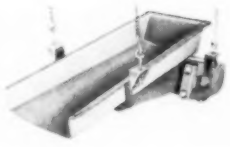

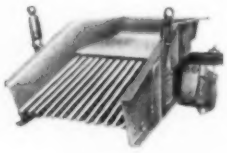

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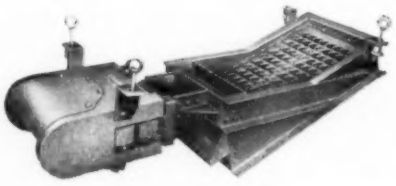

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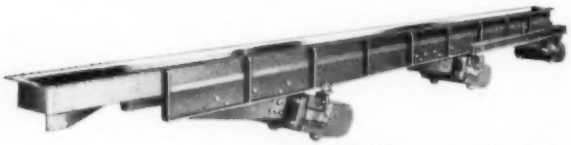

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(*Continued from page* 179)

instructor at the Belvidere High School, Belvidere, Ill., attended the meeting with several of his vocational students.—*J. M. Zilka, Gunite Foundries Corp.*

Detroit

TO assist Detroit area foundrymen with the ever-present problem of scrap and casting defects, Detroit chapter of the AFS will conduct its second annual casting defect clinic Mar. 17 at Rackham Educational Memorial.

Local foundries and purchasers of castings are invited to submit samples of their troublesome castings for discussion, analysis and suggested remedies for eliminating the source of the defect or the cause of the scrap. Michael Warchol, metallurgist, Atlas Foundry Co., will serve as moderator for the clinic.

In announcing the clinic, Ray Wilcox, metallurgist, Michigan Steel Casting Co., and chapter chairman, drew particular attention to the fact that the clinic places at the disposal of local foundrymen the training, ability and experience of national authorities without cost.

Twin City

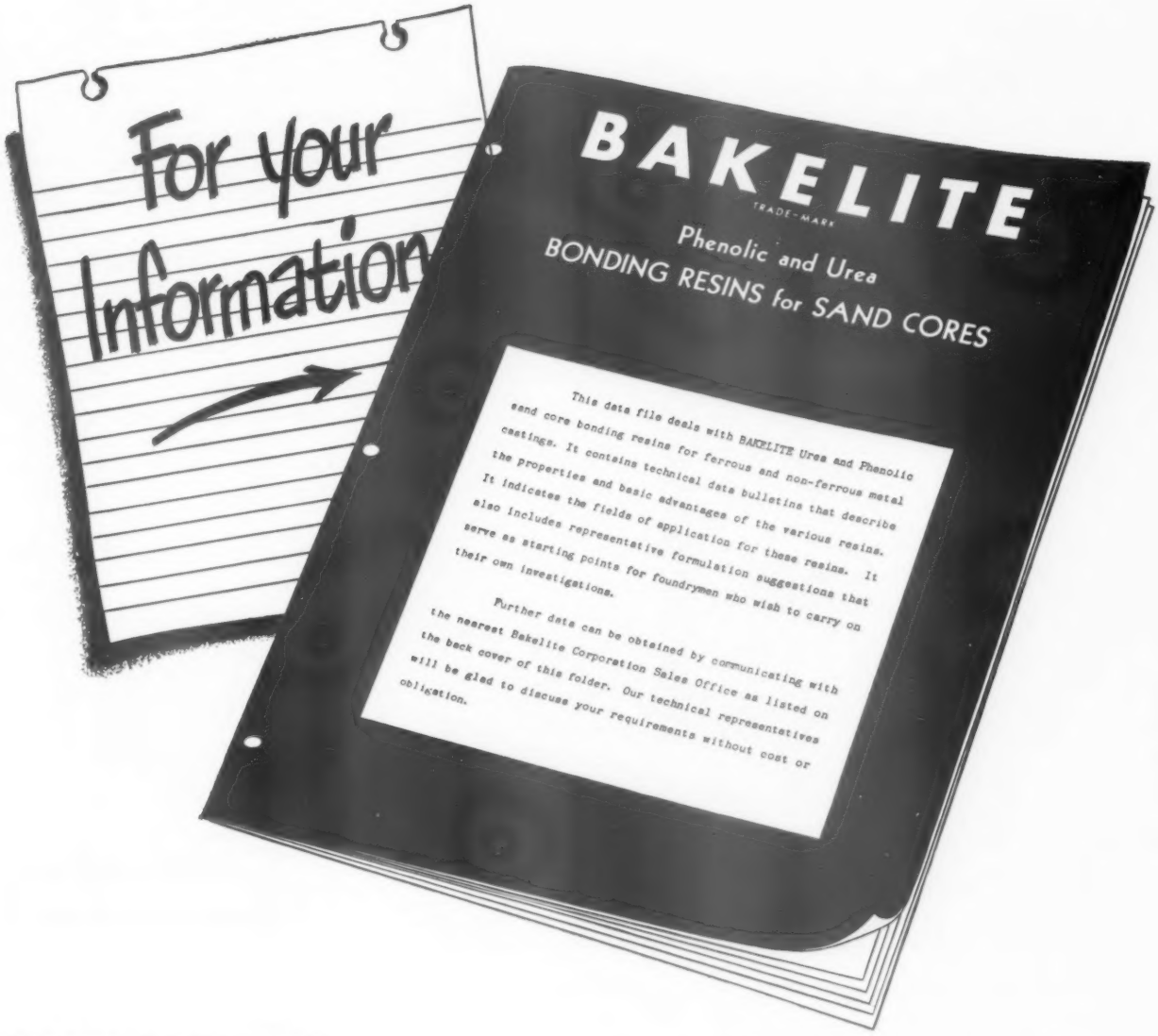
A DISCUSSION on production and use of foundry sands was presented by Bradley Booth, foundry engineer, Carpenter Bros., Milwaukee, at the Jan. 10 meeting of Twin City Chapter of the AFS. Mr. Booth accompanied his lecture with a series of colored slides. First defining his subject and explaining some of the history connected with the use of sands in the foundry industry, the speaker divided foundry sands into five classes: Silica, dune, bank, molding and miscellaneous which includes olivine, zirconite, etc.—*O. J. Myers, Werner G. Smith Co.*

Connecticut Nonferrous

OFFICERS recently elected by the Connecticut Non-Ferrous Foundrymen's Association to serve for the coming year are: President, T. Joseph Judge, Jenkins Bros. Co., Bridgeport, Conn.; vice president, Owen Johnson, H. B. Ives Co., New Haven, Conn.; treasurer, Stafford W. Chappell, Electric Boat Co., Groton, Conn.; secretary, Louis G. Tarantino, Niagara Falls Smelting & Refining Division, Continental Copper & Steel Industries Inc., New Haven; technical secretary, Charles A. H. Knapp, R. Lavin & Sons Inc., Clinton, Conn.

Members of the executive committee are: Chairman, J. Joseph Shan-

(*Continued on page* 184)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This data file deals with BAKELITE Urea and Phenolic sand core bonding resins for ferrous and non-ferrous metal castings. It contains technical data bulletins that describe the properties and basic advantages of the various resins. It indicates the fields of application for these resins. It also includes representative formulation suggestions that serve as starting points for foundrymen who wish to carry on their own investigations.
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(*Continued from page* 182)

non, Jenkins Bros. Co., Bridgeport; Howard A. Phelps, Knapp Foundry Co., Guilford, Conn.; S. W. Chappell Sr., Electric Boat Co., Groton; Walter J. Kenney, New Britain, Conn.; and D. Wesley Case, Belknap Mfg. Co., Bridgeport.—*Louis G. Tarantino, Niagara Falls Smelting & Refining Division.*

Washington

NODULAR iron was the topic of discussion at the Jan. 20 meeting of Washington Chapter of the AFS, held at the Gowman Hotel, Seattle. Tentative plans to hold a sand school were announced.

Principal speaker was J. E. Rehder, Canadian Bureau of Mines, Ottawa, Ont., Canada. Mr. Rehder described

National Society for Crippled Children and Adults, 11 S. LaSalle St., Chicago 3, Ill.

the physical characteristics of nodular iron and discussed its production, pointing out that carbon, silicon, manganese, phosphorus and sulphur must be closely controlled. The speaker stated that working magnesium—that capable of causing nodule formation—may be determined by subtracting residual sulphur from residual magnesium. Working magnesium of 0.04 to 0.10 gives best results. More working magnesium is required for heavier castings.

Mr. Rehder recommended use of the keel block test bar to produce a properly fed bar. Fully annealed bars can give 60,000 to 70,000 psi tensile strength, 40,000 to 50,000 psi yield strength, with 20 to 28 per cent elongation. In the speaker's opinion, extensive use of the material depends on redesign to take advantage of its superior qualities. This can result in the customer getting a stronger product at a lower price, and the foundryman can sell his improved product at a favorable profit margin. —*Harold R. Wolfer, Puget Sound Naval Shipyard.*

Eastern Canada

NEW core practices were discussed by Dr. H. K. Salzberg, a membe of the research staff of the Chemical Division, Borden Co., Bainbridge, N. Y., at the meeting of Eastern Canada Chapter of the AFS held Jan. 13 at the Mount Royal Hotel, Montreal, Que., Canada.

Dr. Salzberg outlined the accomplishments which have brought the foundry industry to its present stage of development. He pointed out that the early progressive steps were generally the ideas of individuals but recently outstanding development work has been accomplished by teams of workers. These include metals, machines, skills, procedures and materials. New materials in which Dr. Salzberg is particularly interested are the phenolic resins. He discussed experimental work and its effect on coreroom practice. — *A. J. Moore, Montreal Bronze Ltd.*

Reading

A TALK, and motion pictures entitled "Progress in Mulling of Foundry Sands," were presented by Chester V. Nass, vice president, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, at the Jan. 17 meeting of the Reading Foundrymen's Association, held at the Berkshire Hotel, Reading, Pa. Mr. Nass discussed modern developments in the preparation and conditioning of core and molding sands.—*W. I. Cassidy, secretary.*

Wisconsin

THE film "Fluid Flow in Transparent Molds" was shown by S. C. Massari, technical director of the American Foundrymen's Society, at the January meeting of the Wisconsin Chapter of the AFS. Approximately 235 members and guests were present. Mr. Massari prefaced the showing of the motion picture with a brief talk on how it was produced.—*John E. Hubel.*

Central Illinois

FOUNDRY Sands" were discussed by Charles B. Schureman, sand consultant, Baroid Sales Division, National Lead Co., Chicago, at the Jan. 9 meeting of Central Illinois Chapter of the AFS held at Jefferson Hotel, Peoria, Ill.

The speaker pointed out that in working with foundry sands, with all possible variables removed, we still experience surprises. For this reason, Mr. Schureman emphasized that sand handling systems should be designed by people who know

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CENTRI-MERGE is *COMPLETELY* automatic in every phase of operation, *COLLECTS* dust and fumes as soon as they occur, *CLEANS* by high pressure water action, *DISPOSES* by mechanical conveyor. Dust and fumes are forced back on a stream of air to collection unit, washed and scrubbed from the air into tank below, permanently trapped under water for quick disposal as sludge.

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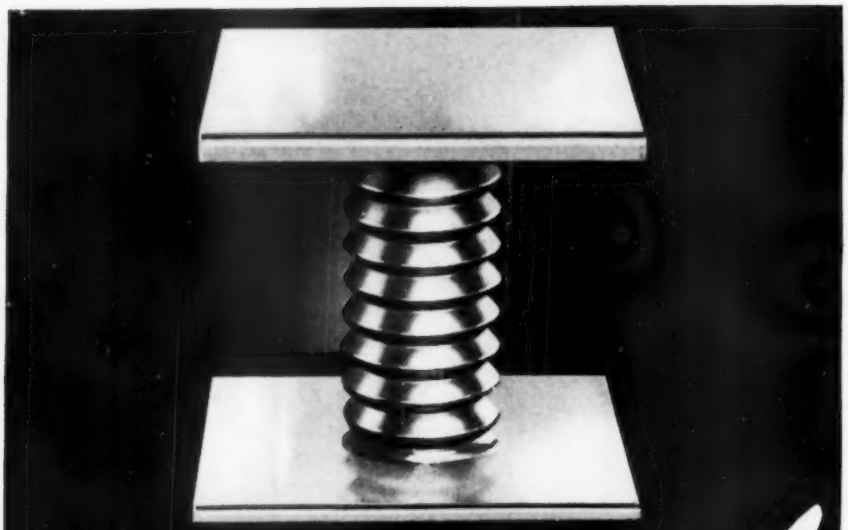

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Compared to the castings in which they are used, chaplets and chills often appear to be trifles. Yet, to foundrymen who are striving for constant improvement in casting quality, they are details of vital importance.

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The Milwaukee Double Head, Thread Stem Chaplet, pictured above, represents but one of the advancements in chaplet design represented in the *Milwaukee Line* of "Vital Details". It includes Standard Radius Chills, Schmitz Chaplets, Patented Adjustable Radius Chills, Special Chaplets and Related Specialties. Write for Samples and Prices.

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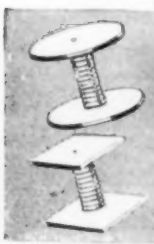

MILWAUKEE CHAPLET

sands. When adequate systems are installed and proper sand mixtures have been proved, rigid controls must be exercised continually. Measuring devices must be checked frequently for accuracy. Proper sequences of mixes and proper mixing time should be established and adhered to. Personnel should be selected with care and trained on the requirements of their job. Any changes necessary in mixes should be recorded and all concerned be informed.

In the question-and-answer period, Mr. Schureman stated that the coarsest constituent of a sand mix determines the casting finish. He recommended that core sands be selected to harmonize with molding sands used in the foundry.

A film on the use of foundry chaplets was shown through the courtesy of the Fanner Mfg. Co., Cleveland. —*John R. Nieman, Caterpillar Tractor Co.*

Steel Founders Meet in Buffalo

The combined management and technical and operating groups of division two, Steel Founders' Society of America, held a regional conference at Hotel Statler, Buffalo, Jan. 26. Intensive research and product development activities to lower costs and improve manufacturing processes and products were emphasized in the discussions.

Principal speakers were F. Kermit Donaldson, Cleveland, executive vice president of the society; William J. Phillips, director of the product development department, and John E. Mullen, vice president, National Erie Corp., Erie, Pa. Mr. Mullen, who also is a member of the society's national board of directors, served as conference chairman.

As key speaker representing the national society, Mr. Donaldson provided a factual summary of current developments in the steel castings industry and reported on the status of recent and pending research and other society undertakings. A special session was devoted to a product development analysis made jointly by Mr. Donaldson and Mr. Phillips.

Euclid Foundry & Machine Equipment Co., 15109 Saranac Rd., Cleveland, has been incorporated by Emil Klauss and Herman Krogmann, who previously operated as a partnership dealing in foundry machinery and equipment. Mr. Krogmann is president and Mr. Klauss, secretary-treasurer of the new organization.

For faster baking time

use CYCOR*151 synthetic resin binder for sand cores and dry molds

Cycor 151 gives foundries 33% to 50% faster baking time than old-time binders—at baking temperatures of only 350°F. This means positive savings in production and BTUs.

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And don't forget this: with Cycor 151, you purchase *only* the neat synthetic resin; you can modify this resin with fillers or extenders to meet your particular requirements.

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By PAT DWYER

Drawings by RICHEY

ADVENTURES OF Bill

WHAT'S the grand idea," Bill inquired the other night, "of crouching silently there in the old armchair, like a banshee wailing under a hawthorn hedge on a rainy night. Like an apprentice who has lost his first casting, or the ardent young swain whose object of devotion has turned up her nose and definitely said NO to his generous offer to take her into full partnership, and turn over his pay envelope to her every Saturday night.

"Brace up, me boy. The long cruel winter is almost over. Spring is almost here. Soon the crocuses and daffy-down-dillies will be sticking their delicate little noses above ground. Brave big and little birds, loaded down to the Plimsoll mark with tropical food and water, will by flying north to look into the housing situation in the land where—as the feller says—nobody lives, nobody comes to see 'em, and the dogs bark at strangers."

"You can take the banshees," I said, "the dopey apprentice, the lad who was turned down, the flowers that bloom in the spring tra-la-la, the birdies with the southern and winter homes, and the dogs in the great waste lands who or what or which, bark at strangers, you can take 'em all, wrap 'em up in two or three strands of hay wire and throw 'em into the cupola. Singly or collectively they have no application in the present situation.

"If you really want to know why I am sitting here quietly and peaceably instead of ranting and roaring, like some people I could mention, it is because I am doing a bit of serious thinking."

"Apology accepted," Bill admitted handsomely. "The court always is lenient on first offense. Would I be violating any of the numerous unwritten laws if I inquired what subject engaged your attention? What clutch of probably addled eggs were you brooding over? And finally, not to put too fine a point on it, can you remember back that far? Kindly answer yes or no."

"Taking up your various questions *seriatim*—a good 2-dollar word meaning serially or one after another—I think that is a good place to leave them, viz., to wit, etc., one after another. However, if you can keep this confidential, and not let it go any further, I don't mind telling you I was thinking of several forks in the long life road, and wondering what would have happened if I had taken, say, the right hand instead of the left hand fork at any of these junctions.

"Looking back over the long, long road, probably every person at one time or another reflects on how rapidly and silently the stream of life has carried him or her along since he or she, first arrived naked and squalling on the right or left bank.

"Just think of a typical ancient male gaffer sitting on the chimney corner with a horse blanket over his skinny knees, and with a saucer of thin gruel at his elbow. He remembers very little of the high or low points in his career. On the other hand, he has the most vivid recollection of events that never happened. He can repeat conversations filled with 'I says' and 'he says.' When he is not engaged in retailing the old moth-eaten tales, with and without variations, he switches to the subject of age. He pipes up for the benefit of any person who cares to listen, or for that matter for the benefit and annoyance of any person in the vicinity, that he has passed the three-quarter post and is well along toward the centennial finish line, in the greatest of all races which offers no prizes and does not pay off to win, place or show."

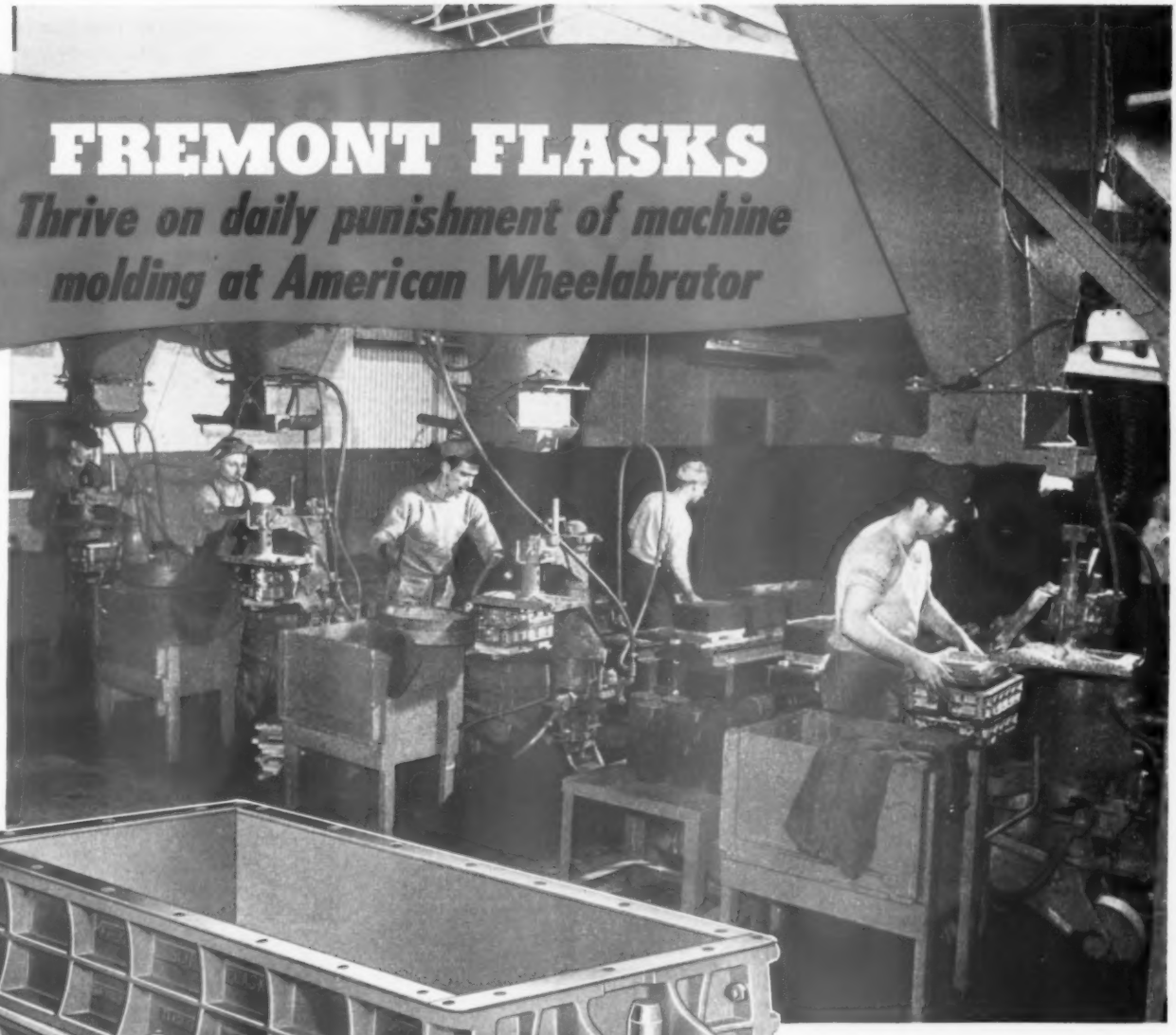
"Go slow," Bill cautioned. "Go slow me boy. The female of the species is more reticent. Up to the age of 20 she flaunts the figures freely and openly. Between 20 and 30 the flaunting is not so enthusiastic. From 30 to 40 she lets it be known that any reference to the subject of age is highly distasteful, if not positively obnoxious. She becomes quite adept at drawing a large, fat red herring across any trail leading directly or

(*Continued on page* 190)

No other exercise can approach the daily dip for developing the full beauty of the manly figure

FREMONT FLASKS

Thrive on daily punishment of machine molding at American Wheelabrator



Courtesy of American Wheelabrator and Equipment Corporation

FREMONT MAGNESIUM FLASKS

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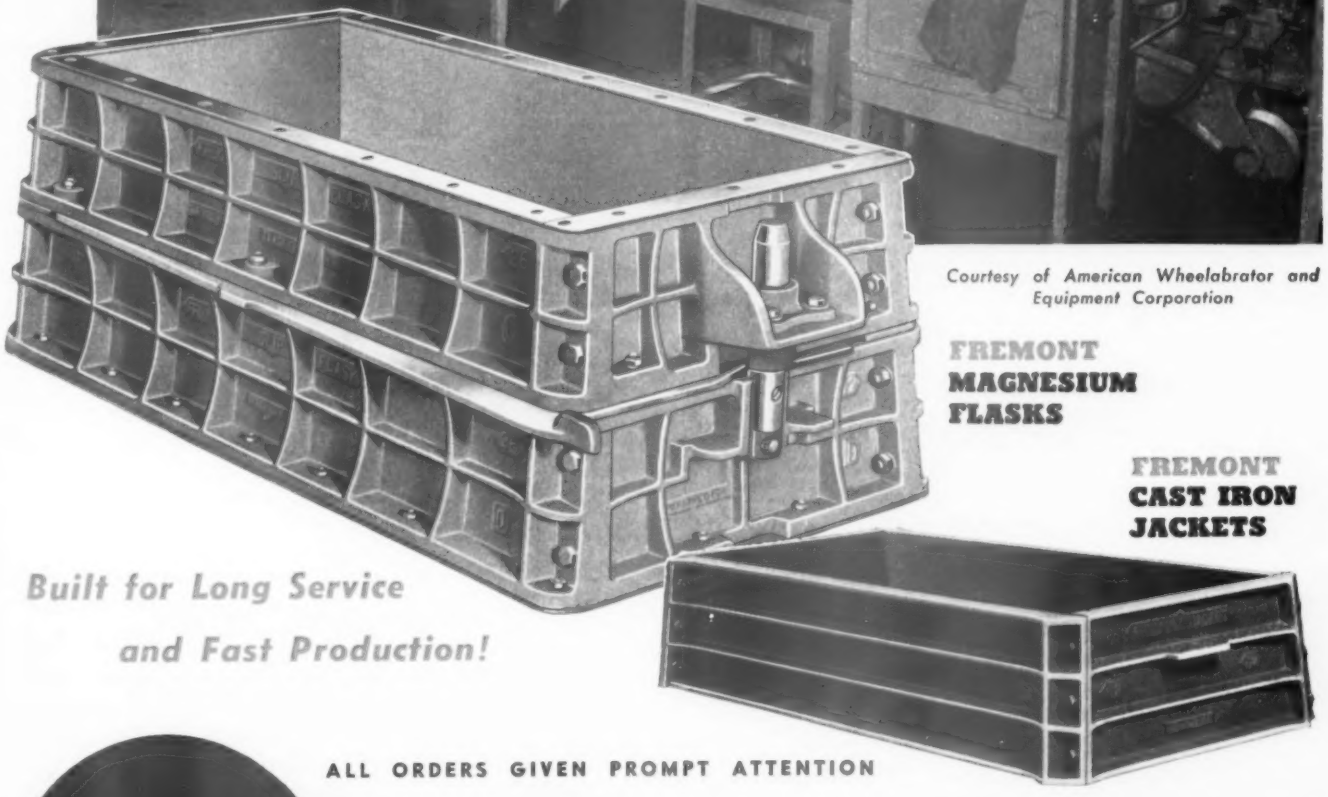

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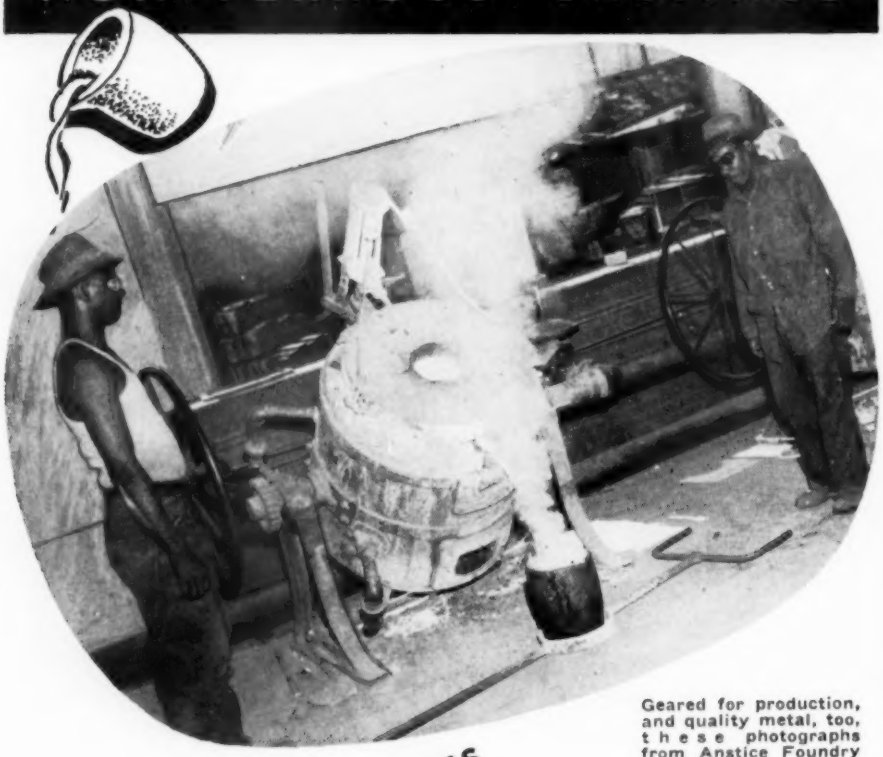

Geared for production, and quality metal, too, these photographs from Anstice Foundry at Rochester, N. Y., show how maximum melting is handled year after year without interruption.

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CRUCIBLE MANUFACTURERS ASSOCIATION

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NEW YORK 6, N.Y.

(*Continued from page* 188)

even indirectly in that direction. After 40—well—you might put it this way: The local, miserly tightwad—there is at least one in every community—who would not give an anxious inquirer the time, is a champion chatterer compared to a lady suddenly exposed to a low-down, nosey, impertinent (a quotation, Son!) reference to age."

"Better lift your foot off the accelerator and touch the brake pedal. Which is just another way of saying you are away out on a long, slippery limb that is not fastened any too securely to the parent trunk. With your kind permission we shall skip all the nosey, low-down and impertinent stuff and confine ourselves to our own section of the population.

"What I had in mind before you touched off your ill-timed and gratuitous little dynamite cartridge, was a brief comment on the manner in which the average man goes through the span of life from the cradle to the grave, usually impelled by forces of luck or chance over which he has no control. The late Mr. Shakespeare had something to say about a tide in the affairs of men, which if taken at the flood, leads on to fame and fortune. If the old memory is up to par, that is in Julius Caesar, Act IV. Scene 3."

"If you ask my opinion," Bill commented, "Old Shake was an optimist. He kind of slipped up on that one. If I was one of these here now radio lads—I can imagine my old Uncle Malachi piously ejaculating: 'The saints be betwixt uz an' all haar-um'—I could knock you out of your seat by sticking in a roguish gag at this point 'Shespeare was no great shakes.' Purry good, hey?

"According to what I hear now and again, the bard was quite a lad at getting a bunch of assorted characters together and have them spray each other with high and low cascades of words, and then more words. In the present instance he neglected to mention that the tide ebbs just as regularly and relentlessly as it flows. According to the law of averages, the number of men and women floating down the river should equal the number traveling in the opposite direction.

"As a plain matter of fact, well known to one and all, the number of bitter and broken hearted, the flotsam and jetsam of the world, borne on the surging and swiftly flowing ebb tide to oblivion—and rest—always has outnumbered the fortunate or lucky few floating toward the high places and temporary world se-

(*Continued on page* 192)

. . . in the foundry also

things are changing!

Progress means change, in the foundry as elsewhere. Competition sets the pace. Many light and heavy castings made for machine parts and various other uses, now have to compete with different methods of manufacture. Skills, judgment, and readiness to take advantage of new knowledge are demanded at such a time. A foundryman who is aware of the challenge needs to be well acquainted with the benefits of Molybdenum, Tungsten, and Boron in making better, stronger cast irons and steels.

The Molybdenum Corporation offers literature and employs a technical staff that can perhaps be helpful. Correspondence is invited.

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Works: Washington, Pa.; York, Pa.

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MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

(*Continued from page* 190)

curity on the incoming flood.

"I think that is enough of that gloomy stuff. If you have no objection we can forget Mr. Shakespeare, his songs and his sayings and confine ourselves to people and events nearer home. For instance if you keep still long enough I shall read you a letter from an old friend of mine who has circulated up, down and around the Rocky Mountains for many years. Ready? Here she comes:

A few months ago—I must have my seketary, ahem, look up the date, although it does not make any real difference—well, anyway, I was reading "The Adventures of Bill" in THE FOUNDRY. He referred to stamp shoes and mortar box castings used in the gold mining industry. In his apprentice days he claimed—and quite properly—that he had lost gallons and gallons of precious sweat, the old salty kind, making, pouring and feeding these castings in the shop where he served his time. Seems to me there is some kind of connection between this term as used in the foundry, and as applied to periods spent inside high-walled establishments. Some day when I have the time I must do a bit of excavating in this subject.

The reference brought to mind somewhat similar experience in my early days in the foundry. Many and many a day, many a year have gone by since I made any of those things.

Away back at a time that is longer ago than I can tell you, and twice as long ago as you can tell me, many canyons, arroyos and gulches on the backbone of the Rockies had stamp mills on them. "Thar wuz gold in them thar hills." I don't know of any big outfits running stamp mills now. Crushing in these modern days is all done in rod and ball mills. The explorer, prospector, tourist or ordinary traveler still can find traces of where the old noisy, earth-shaking crushers once were the center of pioneering activity. The rough, tough, hairy men are no more. "Their bones are dust, their good swords rust, and their souls are with the saints, we trust!"

O, yeah. I remember the shoes and cams and how the cam hit the tappet,

Then Miss Clancy lowered the boom

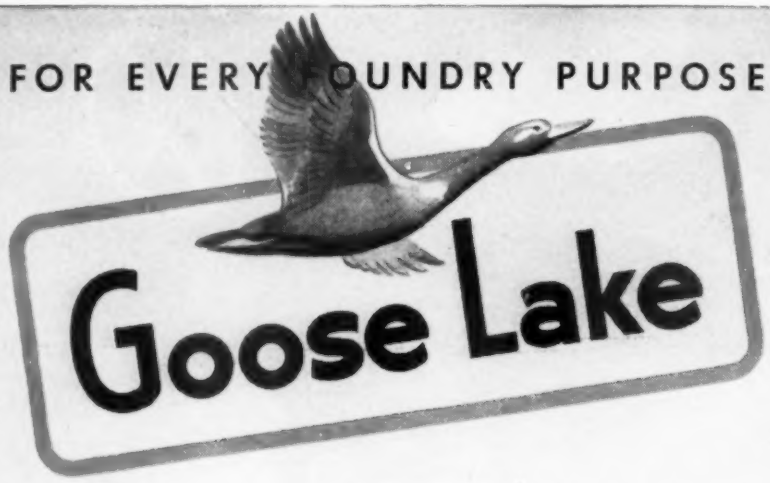
shaped like a spool with a gib or keyway in it. The tappet lifted the shoe to drop on a die and thus crush the quartz rock in the mortar box.

Each die was a solid cylindrical chunk of white iron with a little flange around the top. In a certain shop in a little gulch town the castings were made in the following manner: We had iron flasks of the proper dimensions to minimize the amount of sand. The cope worked on cast-on hinges and we did not have any bottom boards. The drag was rolled over and flopped on a sand bed. A man had to be fast and strong to work on this job.

When the drag was rolled over, an additional piece about 4½-in. diameter, shaped like an inverted shallow saucer, was placed on top of the pattern. This button or saucer was made of lead so that it would stay in place and not lift with the cope. The cope surface was covered with a very strong facing, with coal dust ratio of about 1 to 6. This facing insured a good lift, and also peeled clean when the cope was rolled back from the still red-hot and not quite solidified casting. This extra metal on top, as you may have guessed,

(*Concluded on page* 194)

FOR EVERY FOUNDRY PURPOSE



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4. **SWINGHEADS MOVE TO CLEAR POSITIONS**
5. **VIBRATION AND PATTERN DRAW**

TIME TAKEN — 10 SECONDS.

The illustration shows a pair of Stone-wallwork Pin Lift Molding Machines controlled by a single Automold unit and only one operator. They produce finished half molds ready for coring and closing.

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MADE IN ENGLAND

STONE-WALLWORK

Foundry Equipment

STONE-WALLWORK LTD., 157 VICTORIA STREET, LONDON, ENGLAND

(*Concluded from page* 192)

was designed to eliminate shrinkage and the hot job of feeding the casting with rod and riser.

Soon after the casting was poured, a helper ran down the gangway at the proper time. The exact time was based on experience and a kind of instinct or sixth sense which nearly all men, foundrymen in particular, seem to develop over a period of years. Obviously some men never get it, while others have it to an extraordinary degree.

With a piece of iron, usually a clamp, the helper held down the sprue with one hand, while he rolled back the cope with the other hand. No place here for the well known one-hand paper hanger. The molder followed the helper. With a large butt rammer he pounded and rubbed the inverted saucer-like hump on top of the casting. He continued to rub until the surface was flat. This treatment eliminated any shrink holes or depression on the face of the casting. If the pounding was done when the casting was too cold, the result would be a split casting. If the casting was too hot, that is in a semi-plastic state, the result was splashy and messy and in either case a scrap casting. Believe me, a man had to be on his toes and had no time to pick daisies or other posies while treating a floor of 20 castings.

Cope and drag were fastened rapidly with little dog clamps, tightened with a wedge and one tap of a hammer, Yeah! Rough and ready, we swabbed around with a dry brush floating in a water bucket. Heh, heh, no time for a littly dinky water bottle on that job. The day's work was 20 molds, condition your own sand, make your own facing, pour the castings, shake 'em out and flatten the tops. Hot? The atmosphere was as hot as it is supposed to be in the establishment presided over by you-know-who, the sprightly gent with the horns, hoofs and forked tail.

Finally the castings had to be dragged out to the gangway with a hand hook, so that a man could wet down the sand and have it ready for the next day. A guy was lucky if he did not "get rocks in his box," the hard rock men's term for dust disease, silicosis to you, on account of all the dust, smoke, gas and heat that filled the air.

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These long range, extra length Marshall Thermocouples are the kind your melting room men should use if your furnaces are big and the conditions hot! These long thermocouples do the job safely and dependably, enabling the operator to stand out of the danger zone of excessive heat and splashing metal. They measure molten temperatures of brass, bronze, aluminum and magnesium quickly and accurately — and with perfect safety no matter how extreme the conditions. Write for descriptive Price List of these extra length Marshall Thermocouples. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.
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Book Review

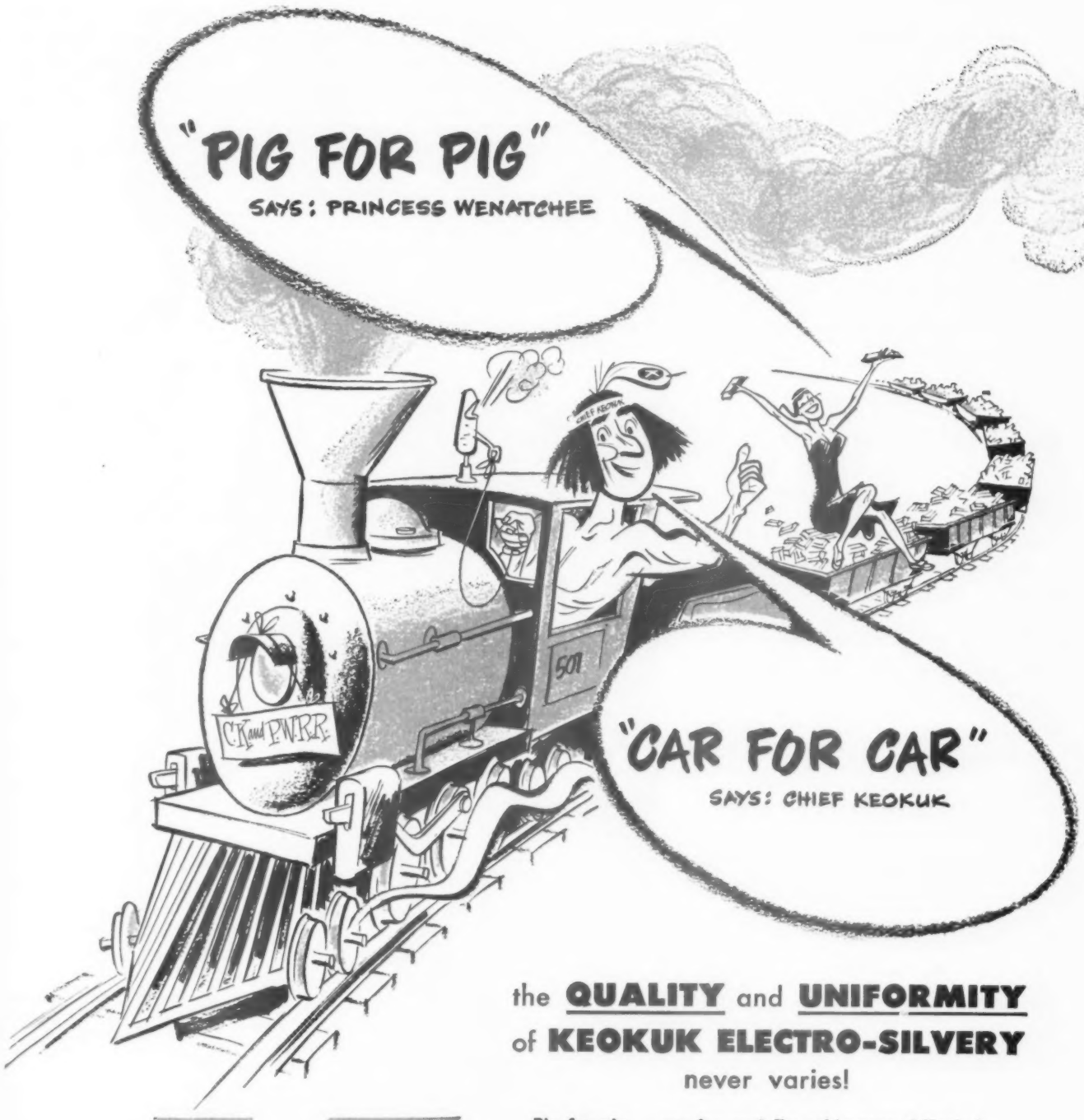
Metallurgische Verarbeitung von Altmetallen und Rueckstaenden, Band I, (Metallurgical Treatment of Scrap Metals and Residues, Part I) by Edmund R. Thews, cloth, 359 pages, 6⅝ x 9⅜ in., published by Carl Hanser Verlag, Muenchen, Germany. Price 22 marks.

This volume published in German deals with the recovery of tin, lead and from scrap, tin-lead alloys, metal-bearing ashes and other residues. Divided into three main sections, the first deals with the economic importance of scrap. Second part discusses the handling and preparation of various types of scrap, and also describes the preparation of and treatment of tin-bearing scrap for recovery of tin through use of hearth and cupola furnaces and refining pots.

Smelting of lead residues in hearth, rotary and cupolas, and refining in kettles is discussed as well as the treatment of tin-lead skimmings and drosses. Handling of fly ash, slags or fluxes and steam-refining of the metals and alloys also is described. Final section gives information on smelting kettle equipment, hearth furnaces, rotary furnaces, and fuels and heating means for hearth and kettle furnaces.

Offers Film

Black, Sivalls & Bryson Inc., 720 Delaware, Kansas City 6, Mo., has produced a new 16-mm color-sound film. Documentary in nature, the film features the company's products at work in the oil fields, and equipment installation sequences, interspersed with scenic shots of the South and Southwest. Running time is approximately 30 minutes. The film is available on a free loan basis.



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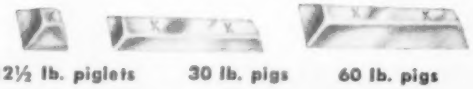

12½ lb. piglets 30 lb. pigs 60 lb. pigs

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Al-Mg Alloy CASTINGS

(*Concluded from page 87*)

cent by weight of the quartz or lake sand used. A very satisfactory synthetic bond is bentonite. The sands, boric acid and bentonite should be lightly milled together for about 15 minutes. The correct moisture content would be 5 to 7 per cent. The latter figure should not be exceeded. A gas permeability in the range of 50 to 70 is required and would be obtained with the mix just described.

Normal aluminum molding and coremaking practice may be followed. Ramming should be as light as possible. Means should be provided to permit of the molds being tilted through a maximum of about 45 degrees during pouring. As stated earlier, the best practice is to pour directly from the melting crucible into the down gate of the mold. The castings should be poured from the bottom and mold tilted when pouring commences, gradually being brought to a horizontal position as it fills. In order to avoid turbulence and prevent dross passing into the mold, the down gate is led to a blind riser which feeds the mold through a number of small gates according to the size and weight of the casting.

The next point requiring particular consideration is that this alloy is rather "hot short." Therefore, the molds, should not be subjected to shock or the castings disturbed for about two hours after pouring. They can then be stripped and allowed to cool to something approaching room temperature before cleaning. Heat treatment practice for this alloy is standardized and consists of a solution treatment for 15 to 20 hours at 800° F, followed by a quench. Quenching in a light mineral oil bath maintained at a temperature of 300° F has been found to give excellent results and avoids the setting up of stresses sometimes resulting from too severe a reduction in temperature; but if reasonable care is exercised, a quench in boiling water is satisfactory.

In these notes it has not been thought necessary to describe the precautions to be taken in all aluminum foundries, but only to mention the chief points to be kept in mind when making castings to SAE Specification No. 324. It is assumed, for example, that the castings will be designed so that rapid changes of section or deep recesses are avoided and that close control is maintained over furnace temperatures. Temperature recorders should be installed and under no circumstances should the furnace temperatures be permitted to exceed 1400° F. Gating and venting of the molds must be suitable.

Similarly, the usual close control is necessary during heat treatment or the castings will not reach the required strength and ductility. If closely controlled and standardized practice is rigidly enforced, a steady rate of satisfactory production is obtainable as readily as in the case of the less sensitive alloys.

TROUBLE-FREE PRODUCTION of quality castings doesn't just happen. The skill and know-how of diecaster or foundry is of prime importance. But the most skilled of craftsmen must have the right raw material to work with.

Whatever your casting problem may be —die cast—permanent mold or sand cast. Specify **S-G** Aluminum Alloys. Every step in their production is checked constantly by skilled laboratory men using the most modern equipment available.

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MIT Foundry Gets Sand Elevator

The metal processing laboratory of Massachusetts Institute of Technology, Cambridge, Mass., recently acquired a bucket elevator for handling sand in its foundry. The equipment, which was presented to the institute by J. C. Corrigan Co., Boston, is used by Prof. H. F. Taylor for classroom instruction and to give future metallurgical engineers facilities for actual practice.

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THE Cupola

(*Continued from page* 77)

Conversely, as the coke is increased the temperature increases (reaching a practical limit) and the melting rate decreases. It is evident, therefore, that there must be some practical range in the quantity of air and coke which can be employed for optimum conditions. Fig. 12 has been designed within this range.

Blast Modification or Conditioning—Up to this point we have treated the subject as it relates to the majority of operations—namely, cold blast and with conventional single row of tuyeres. We are, however, interested in knowing what changes take place in an operation when certain blast modifications are introduced. These will be discussed briefly.

As generally constructed the second row of tuyeres which vary in number and size, but smaller than the main tuyeres, are located 10 to 12-in. above the bottom row. The use of the second row of tuyeres is generally employed to modify some inherent difficulty with a particular operation. They do help under certain conditions, but in the writer's opinion the difficulty can generally be corrected without their installation.

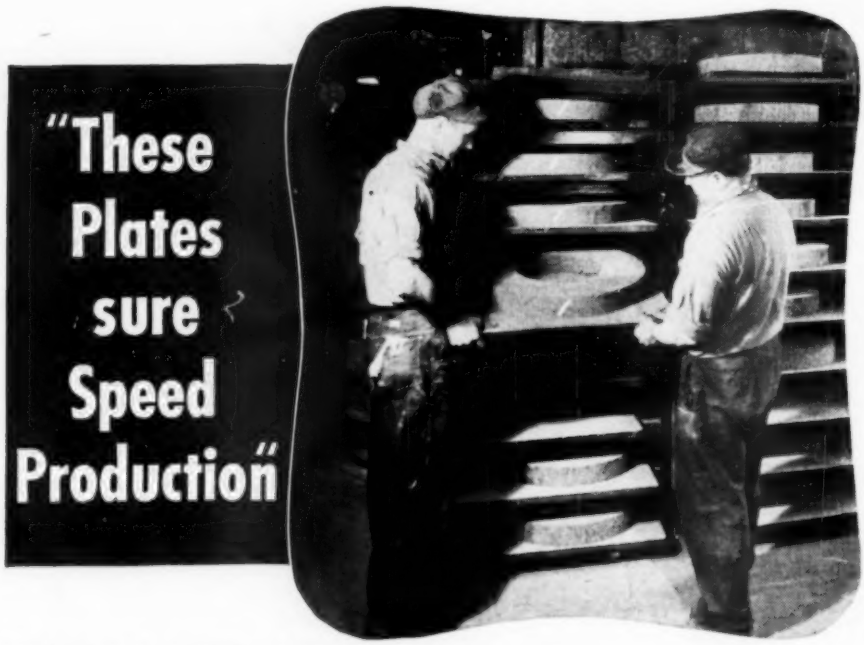
The general effect of the second row of tuyeres is to introduce oxygen higher in the bed, necessitating the maintenance of a higher coke bed to offset this condition. Higher temperatures result from this higher bed. It has also frequently been noticed that localized burn-out of the lining occurs directly above each upper tuyere in the form of a crater, indicating localized zones of increased activity. This is contrary to what we want to accomplish, in that our objective is to maintain uniform combustion conditions across the entire bed area.

Has Three Rows of Tuyeres

The balanced blast cupola, which is a conventional cupola with a special tuyere arrangement, consists of three rows of tuyeres, with the tuyeres in each row smaller in size that in the previous row below. Each tuyere in the bottom row is equipped with a valve for periodically shutting off the blast in one or more tuyeres. The claims for this cupola are greater fuel economy by virtue of a higher CO_2 production in the waste gases. It is difficult to reconcile the claims and the conclusions for this process with the fundamentals of the combustion within the cupola. Actually the same stage of combustion, namely, a higher-than-normal CO_2 content of the stack gases, usually can be obtained in the cupola by thinning the coke ratio and/or increasing the air. It is claimed that the CO initially formed is burned to CO_2 by the oxygen introduced through the second and third rows of tuyeres, thus releasing additional heat. This certainly is possible. However, by elevating the tuyeres above the normal zone free oxygen exists at a point higher than in a normal cupola, and this oxygen must be consumed before the gases reach the top of the operating bed, or oxidized iron will result. The same correction must be applied as in a normal cupola, namely, raising the coke bed so that the free oxygen will be consumed. Any normal cupola can be run to produce a high CO_2 content in the stack gases by operating with a thin coke ratio and a high air rate.

One desirable feature of the balanced blast cupola has been the control valves on the lower tuyeres which, when operated on a cycle of periodic closure, will result in min-

(*Continued on page* 200)



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(*Continued from page* 198)

imizing "bridging" conditions.

In the writer's opinion, with the exception of the control valves, the performance of the balanced blast cupola can be equalled by any other well designed and well operated conventional cupola with a single row of tuyeres.

The hot blast cupola is designed for either internal or external heating. By internal is meant the extraction of the heat from the stack gases. Obviously this system will permit greater fuel economy than the cupola operating where the stack gases are lost to the atmosphere.

One type burns the residual CO in a stove to preheat the air passing through tubes. A second type conducts the air through a series of pipes in the section of the cupola below the door to preheat it by means of the sensible heat in the gases. No stack gases are burned in this process.

The external system employs a second source of fuel to preheat the air entering the cupola. In this instance, the overall thermal efficiency is reduced by virtue of consuming a supply of additional fuel.

The relative merits of either type of hot blast is strictly a question of economics of initial cost, maintenance and resulting efficiency in melting. The benefits of the hot blast system on cupola operation (disregarding investment costs) is unquestioned. "Bridging" in the cupola is reduced to a minimum. Better coke ratios are possible, which permits faster melting, and higher temperatures are easier to maintain because of producing a cleaner cupola through the heat.

In recent years attention has been directed toward the effect of varying moisture content of the air on cupola operation and metal characteristics. For normal atmospheric pressure the per cent by volume of moisture in saturated air can vary from 0.6 per cent at 30°F to 6.5 per cent at 100°F. At an air rate of 10,000 cfm this would be equivalent to introducing 2.6 lb per minute of water at 30°F and 33 lb per minute of water at 100°F. Unquestionably this variation in moisture content, which is possible in year-round operation, exerts some influence on cupola operation. Additional coke is required at the high moisture content level because of the heat required for disassociation of the water, and it is further claimed that the hydrogen originating from the water gas reaction exerts an adverse effect upon metal properties.

Plants using dehumidification systems have generally felt that they have been beneficial to their operation. The decision with respect to the use of this equipment, however, is still largely a question of the potential benefits vs. the investment and operating costs, and the writer feels that the full benefits possible with the conventional cupola should first be obtained by rigorously adhering to the well established methods of exact control.

Mode of Operation — Up to this point we have confined the discussion to the mechanics and chemistry of the process, emphasizing the fundamental laws governing a cupola's performance. In effect we have a machine which, with proper materials and equipment, will function along certain lines so long as the variable factors are properly co-ordinated. This co-ordination rests entirely with the supervisors, and the decisions made then determine which way the cupola will actually operate. A few examples will illustrate this point.

Referring again to Fig. 12, if we hold the coke ratio constant, the melting rate will increase at a given rate with an increase in the air rate. But

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there is a practical limit beyond which we cannot go without getting into trouble with the iron because of the limiting features of combustion conditions and cupola capacity.

Frequently a shop practice is encountered where the cupola is made to carry the entire burden of a variable shop demand. Within the limit of the melting rate capacity of the cupola this is satisfactory; however, when a reasonable capacity is exceeded, trouble with the metal from one source or another will unquestionably result, with potentially higher losses. When a slower-than-normal melting rate is required, it is almost certain that the metal temperature will drop, again resulting in a higher potential loss unless, of course, excess coke is used.

For best cupola operation, therefore, a reasonable and constant melting rate should be determined and set for a given cupola. In most instances the work in the shop can actually be adjusted for this reasonable rate and the benefits of constantly good metal will justify this adjustment.

Air Rate vs Coke Ratio—Again referring to Fig. 12, note that with the air rate held constant an increase in coke will cause a decrease in melting rate.

When the operation is in an uncertain state of balance and a persistent drop in metal temperature has occurred or occurs regularly each day at a certain time, the quickest correction is to reduce the air rate. If the temperature drop has been due to a lowering of the bed because of insufficient coke the metal temperature will recover. In the meanwhile a "coke booster" should be added and the coke per charge increased. When these reach the bed the air can be raised to its original level.

Too much coke can also cause a temperature drop but this will be accomplished by a slower melting rate, and the carbon may be higher than desired. A correction would be to initially increase the air until the temperature recovered, followed by a reduction in both air and coke until proper conditions have been established.

When conditions in the cupola are within a practical balance it is possible within certain limits to increase the air and lower the carbon in the iron, and conversely to decrease the air to raise the carbon in the iron. In effect this raises and lowers the percentage of CO_2 produced by increasing and decreasing the state of oxidation within the cupola.

It is not good practice to vary the air upward or downward during a heat, except in searching for a better adjustment. It would be better to rebalance the composition of the metal mix and then find the proper balance of air and coke to maintain the analysis desired.

Frequently the writer has encountered conditions where the blower has a capacity considerably in excess of the melting rate of the cupola to which it is attached. With no metering equipment the operation has been adjusted by adding coke until all of the surplus air is satisfied. The net result of such an operation, of course, is high coke costs, slow melting rate, and difficulty in maintaining desired analyses, particularly if high-strength iron of low carbon content is desired. In this instance, it would be much cheaper to install a reliable meter and establish the correct amount of air and coke required. The cost of the meter can easily be justified on the basis of overall savings.

If the higher amount of coke is not added to use up the surplus air, oxidation of the metal must result with consequent bad iron and high shop losses.

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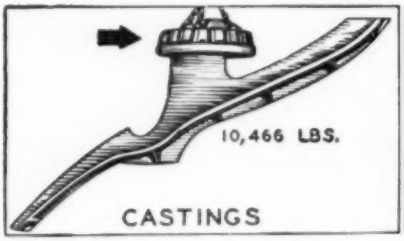
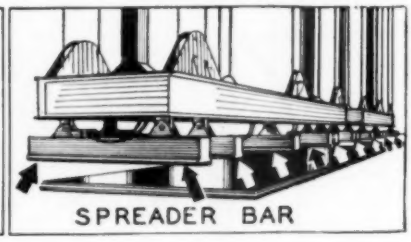
Frequently the blower has insufficient capacity for the cupola to which it is attached. As the shop demand increases the only way in which more metal can be obtained is to decrease the coke per charge or to extend the length of the heat. Thinning the coke ratio may result in oxidation and lower metal temperatures, with consequent increase in scrap. If the length of the heat is extended, overtime costs increase. In either event, the cheaper and more satisfactory correction is a larger blower.

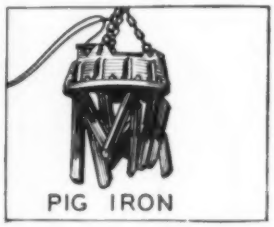
It is quite evident that the practices quoted above run counter to the laws governing the cupola which will emphasize the reason for including "Mode of Operation" as one of the variables needing control.

Conclusion—The cupola is an amazing melting unit when we consider the extreme range in demands made upon it. Frequently it will perform for months giving little or no trouble, and again it may be touch-and-go to the point of driving the operator insane. The writer feels, however, that its behavior can be determined and controlled and has pointed out the fundamental laws which must be recognized and made the basis for establishing the manner of its operation.





Lifting Magnets
FOR ALL PURPOSES



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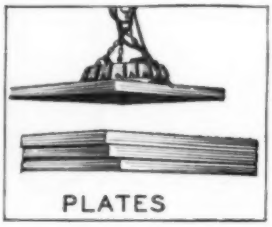
You can cut down the time for loading, unloading and moving hard to handle materials and make a direct saving of hand labor.

Let Stearns give you a lift with experience engineered, dependable magnets. Available in all practical sizes and shapes to suit your requirements.



Stearns Magnets are being successfully and profitably used in handling scrap iron, loose or baled; steel plates, coils, bundles, strips, rails, slabs, billets, pig iron, castings, borings, turnings, finished products, etc., as well as for road and floor sweeping purposes. Can be installed on industrial crane trucks for out of the way spots not reached by overhead cranes.

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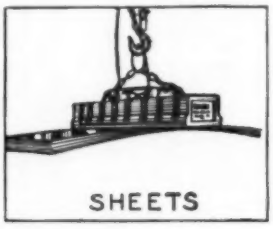

And—we can furnish Suspended Separation Magnets also in sizes and shapes to do your work.

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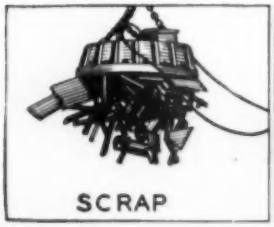
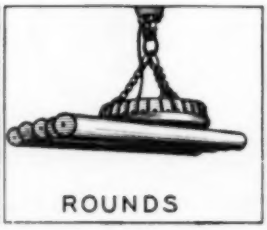
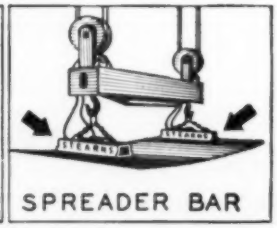






Book Review

The Ferrous Metal Industry in Germany During the Period 1939-1945, by George Patchin and Ernest Breevin, paper, 270 pages 6 x 9⅝ in., published by British Information Services, 30 Rockefeller Plaza, New York. Price, $1.15.

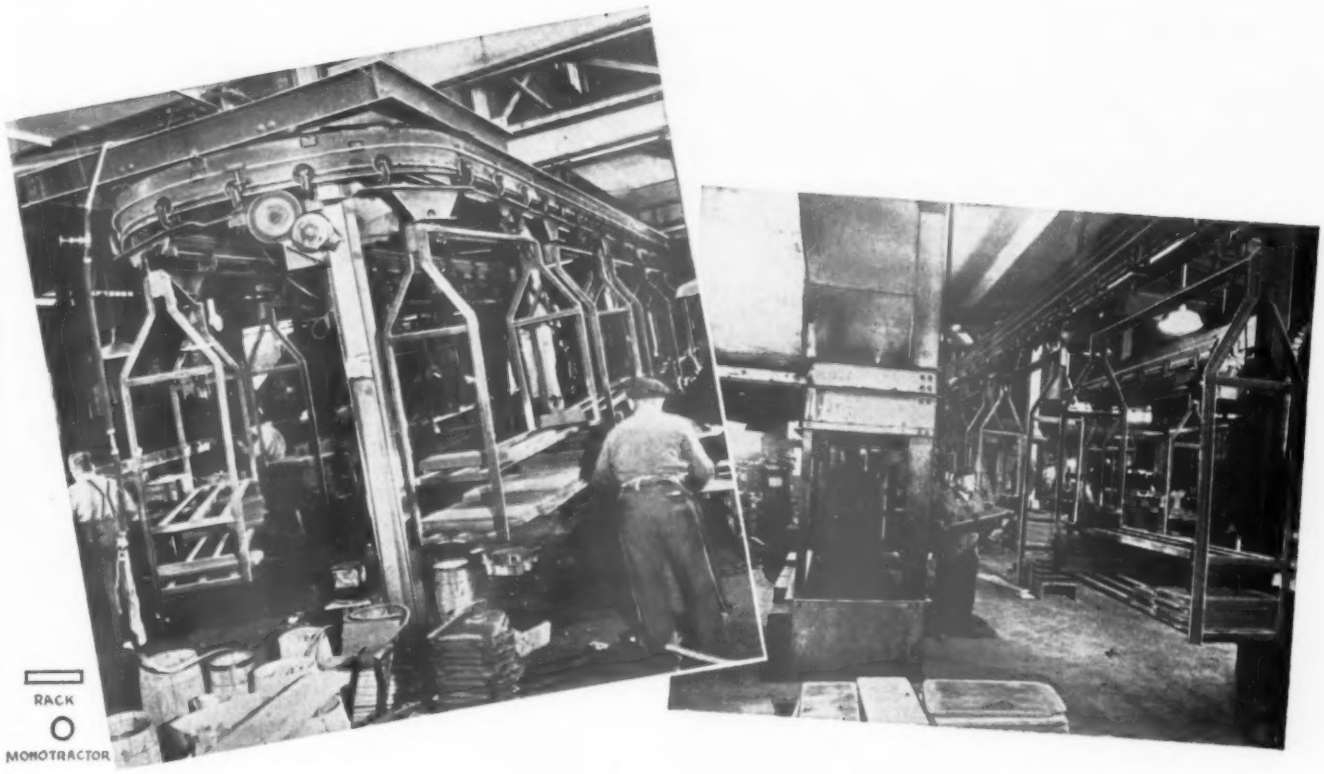
This British Intelligence Objectives subcommittee Report No. 15 represents a compilation of the vast amount of information collected under the auspices of a number of British agencies. The report is divided into nine sections as follows: Blast furnace plant and practice; production of steel; mechanical treatment; foundry practice; steels, ferroalloys and hard metals; heat treatment; cutting, joining, repairing and fastening; castings; and research and testing. The foundry section deals with melting, materials and equipment for molding and core making, foundry methods, iron castings, steel castings, mechanization and protective coatings.

Offers Pamphlets

American Management Association, 330 West 42nd St., New York 18, has issued five new pamphlets dealing with welfare, security, packaging, and materials handling issues. They are: "Labor Relations and Political Action—the Challenge to Management," price 50 cents; "Developments in Social Security and Workmen's Compensation," price $1; "Welfare Issues in Collective Bargaining," price $1; "Cost Reduction in Materials Handling and Shipping," price $1, and "Improving the Efficiency of Packaging Production," price 75 cents.

To Offer Quality Control Course

Washington University, St. Louis, has announced its annual industrial quality control course to be given there Apr. 17-29. Examples of application will be described by industrial representatives of chemical, paper, leather, ceramic, foundry, and rubber companies, etc. Enrollment will be limited to facilities available to permit adequate personal instruction. James H. Batchelor, management consultant and lecturer in industrial engineering at the university, will be in charge of the course.



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NEW Equipment AND SUPPLIES

For Additional Information on these Items Use Reply Card—Page 207

(1)—Vibrating Conveyor:

Jeffrey Mfg. Co., 907 North Fourth St., Columbus 16, O.—Mechanical vibrating conveyor consists of a conveyor deck (pan or tube) mounted on cantilever spring bars, two beam supports, a counterweight which also is mounted on cantilever spring bars and floating eccentric shaft drive actuated by an electric motor through V-belt drive. Weights of the conveyor deck and counterweight are balanced. Since the built-up restoring force of the cantilever bars is the basic drive force, the motor-driven eccentric shaft simply maintains the balanced forces. Very little power is required to operate the conveyor, it is claimed. Up to 80 ft of conveyor can be operated from one drive unit. Vibration is isolated within the machine. Supporting structures receive no vertical or horizontal thrusts and need only be strong enough to carry the dead weight of the equipment and its load. All types of bulk materials—hot, cold, wet or dry—can be conveyed at uniform, controlled depths horizontally, down hill or uphill as steep as 10 degrees, it is said.

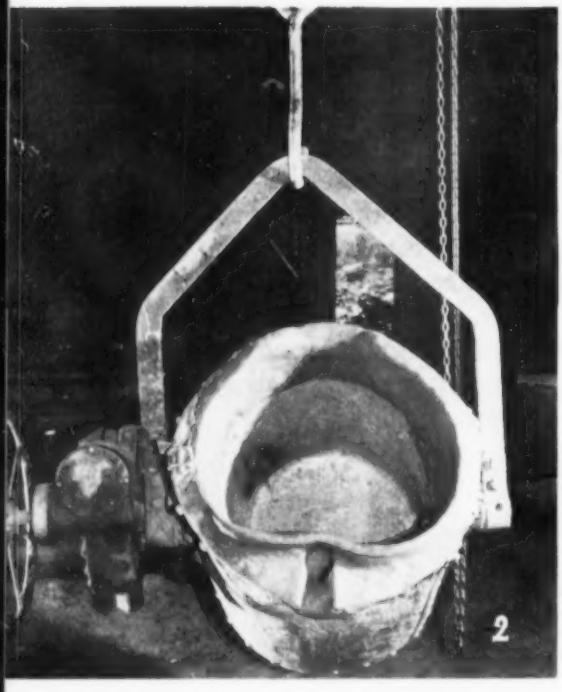
For More Details Circle No. 1—Page 207

1

(2)—Refractory Material:

North State Pyrophyllite Co., Pomona, N. C.—Plastic refractory material is manufactured from mineral pyrophyllite and is said to offer good resistance to slagging and the penetration of molten metal. The material has been used as a monolithic lining for cupolas and ladles, and may be rammed either by hand or air rammer. The company cites the experience of one foundry which ran 110 heats in a cupola lined with the material. During that period, repairs had been made only to the melting zone with the company's ganister compound. The ladle in the accompanying illustration is said to have had months of continuous service. It was lined originally with plastic compound and repaired with ganister. The plastic material is packed in 100-lb moisture-proof cartons. The ganister is offered in 100-lb bags and is mixed with water for use.

For More Details Circle No. 2—Page 207



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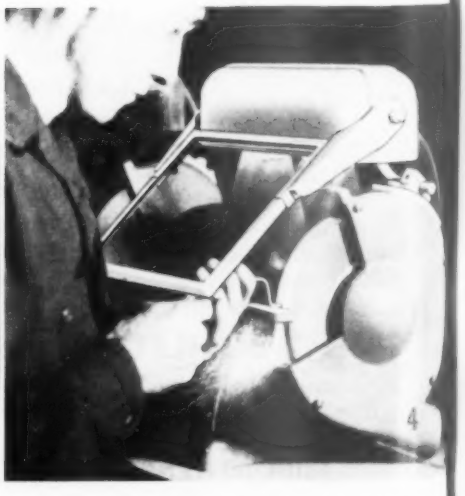
(3)—Disk File:

Kennametal Inc., 1 Lloyd Ave., Latrobe, Pa. — New type of disk file has been developed for snagging castings, cutting off flashing, facing and squaring up surfaces, and similar operations on nonferrous metals and plastics. Triangular prisms of strong, hard metal (90 Rockwell A) are copper-brazed to the face of a steel back-up plate in a number of courses to form a multiplicity of sharp, sturdy cutting edges. They are so shaped, grouped, and positioned as to provide an efficient and free-cutting action. Material is removed in sizable chips; there is no abrasive dust. A smooth,

3



4

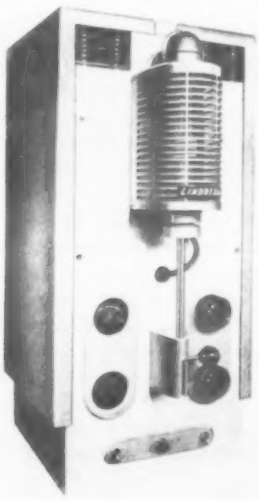
true surface is produced, it is claimed. Disk files are available in 6, 8, 10 and 12-in. diam. They may be mounted on a grinder, abrasive disk machine, motor end, or disk file machine by means of a suitable adapter. Recommended speeds range from 5000 to 7000 sfm for the harder materials, and 8000 to 9000 sfm for soft or gummy materials.

For More Details Circle No. 3—Page 207

(4)—Safety Shield: Junkin Safety Appliance Co., 930 West Hill St., Louisville 8—Safety shield for use on stationary grinders protects the operator's eyes and face from sparks, flying chips, and emery dust, yet offers unrestricted view of the work. It also serves as a machine control because the grinder cannot be started when the movable shatterproof glass shield is not in a completely protective position. Incorporated in the shield are two lights which focus directly on the point of work. Mercury switches control electrical circuits to the shield's two lights and to the starting switch. A plain protective cover glass on the work side is said to be replaced easily when it becomes pitted or scarred.

For More Details Circle No. 4—Page 207

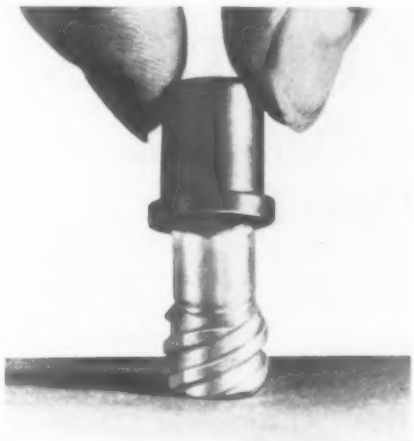
Combustion Unit: Lindberg Engineering Co., 2453 West Hubbard St., Chicago 12—High-frequency combustion unit is designed for carbon and sulphur analyses of iron and steel by direct combustion at temperatures above 3000° F. The sample is heated by induction, and in 2 or 3 seconds it is melted. Adjacent parts such as crucible, tube, etc., are heated only by radiation or conduction from the relatively small mass of the charge. The apparatus comprises a short vertical glass combustion tube surrounded by an air-cooled coil to which radio frequency energy is supplied by a vacuum tube oscillator.



The conventional boat is replaced by a high refractory "cupelet" developed to withstand the thermal shock produced during the combustion cycle. Oxygen is introduced through integral piping, and flow is regulated by control valves on the front panel. Loading and sealing is accomplished by a vertical bolt-action mechanism. Relative position of the coil and crucible is established by an adjustable pedestal supporting a ceramic hearth. The unit is 28½-in. high, 13½-in. wide, 17 in. deep and operates on 115 v, 60 c, single phase current.

For More Details Circle No. 5—Page 207

Plastic Caps: S. S. White Dental Mfg. Co., Plastics Division, 10 East 40th St., New York 16—Elastoplastic caps which fit over ⅜-in. Alemite dot fittings are designed to prevent dirt and other matter from lodging on the tip and being forced into the fitting on the first lead-in shot of the grease gun. Caps are made of black, flexible vinylite. They are easily applied and removed, and



hold by friction fit. They are unaffected by oils, grease, or gasoline, it is claimed.

For More Details Circle No. 6—Page 207

Alloy: Cerro de Pasco Copper Corp., 40 Wall St., New York—A noneutectic alloy of bismuth and tin is said to possess reasonable hardness, negligible shrinkage and extensive melting range. The following physical properties are claimed: Melting range, 281 to 338° F; yield temperature 302° F; weight, 0.296 lb per cu in.; brinell hardness, 22, and shrinkage, 0.0001 in. per in. It is suitable for use in investment casting. It also works satisfactorily in spray guns and for low temperature soldering of pretinned metal parts.

For More Details Circle No. 7—Page 207

Portable Vibrator: Cleveland Vibrator Co., 2789 Clinton Ave., Cleveland 13—Newly developed pneumatic vibrator features a vise-like head which facilitates quick, easy attachment to any 2 x 4, 2 x 6 or 2 x 8 in. wooden stud or to metal structural members of comparable sizes. It can be attached to concrete forms, hoppers, bins, dump trucks, and many other types of containers to settle or to shake out powdered, granular, or semiliquid ma-

terials. Vibrator operates at speeds ranging from 1000 blows at 50 psi line pressure to 3600 blows per minute at 100 psi. Air consumption varies from 5 to 10 cfm depending upon operating speed and line pressure. Unit weighs about 11 lb.

For More Details Circle No. 8—Page 207

Respirators: American Optical Co., Southbridge, Mass.—New line of twin-cartridge respirators has been developed to provide protection against seven respiratory hazards through a basic face piece and seven interchangeable filters. The seven filters protect workers against a combination of all dusts, organic vapors, acid gases, combined acid and organic gases, ammonia, combination of organic vapors and all dusts, and metal fumes. The basic face piece of the new respirator is molded from durable rubber and has a new rolled edge that curves inward to give a snug fit without leakage. Other features claimed include a flexible fitting brace for shaping the respirators to individual features, an efficient inhalation and exhalation system and increased field of vision through thinner filter cartridges.

For More Details Circle No. 9—Page 207

Machinability Tester: Vanton Equipment Corp., Empire State Bldg., New York 1—Simple workshop unit is designed for testing the machinability of ferrous and nonferrous metals. The unit offers a machinability index capable of development into a universal standard. This is done by a simple workshop test accomplished by one of the usual cutting operations such as turning or planing. The tester measures the specific cutting resistance exerted by a material against the penetration of a standardized kind and shape of cutting tool. Unit also measures the abrasive effect of the same work

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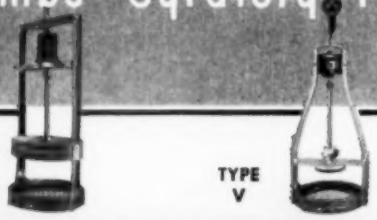

GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U.S.A.

material on a hardened calibrator. This effect of abrasion is determined by measuring the abraded flat on a standardized 10-mm test ball. The machinability index is defined as machining effort, determined by multiplying the measured specific cutting resistance by the measured abrasion factor.

For More Details Circle No. 10—Page 207

Film-drying Machine: General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14—High-output x-ray film-drying machine can be installed on a high base with the top at workbench level, or in stacks of two on a low base. In either case the films are in easy reach of

a technician of average height. The single unit is said to completely dry 150 films a day at 86 per cent humidity or 180 at 38 per cent. This includes one minute a film for loading and unloading. The double units' output ranges from 270 films a day at 86 per cent humidity to 300 at 38 per cent. In making its output tests, the company considered a film dry only when it was completely dry under the clips. In the new drier, air intake and exhaust are decreased and provision is made for the air to be recirculated over the heater and films many times to get the maximum absorption.

For More Details Circle No. 11—Page 207

Car Shaker: American Engineering Co., Aramingo Ave. & Cumberland St., Philadelphia 25—Low-head car shaker to help unload open hopper-bottom cars is offered in combination with a 5-ton twin hook hoist and controls or with a single-hook 5-ton hoist and controls. The car shaker also is available separately for use with existing hoisting equipment. Double safety is provided by interlocking controls furnished with company motorized trolley hoists in the car shaker-hoist combination. The car shaker cannot be operated until the shaker is in position; conversely, the motor trolley cannot be started when

(*Continued on page* 210)

page 207 - 208 Missing

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SINGLE AND MULTIPLE BURNERS

AUTOMATIC PROPORTIONING SINGLE VALVE CONTROL ASSURES UNIFORM RESULTS WITH MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 206)

the shaker is in operation. When a hand-geared trolley hoist or bolt suspension type is selected, interlocking trolley control is omitted.

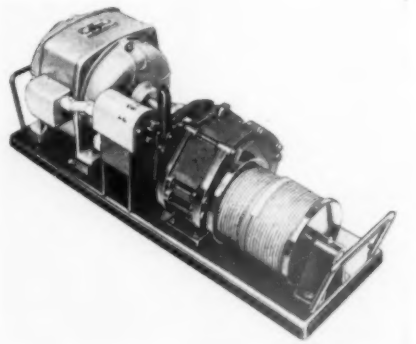
For More Details Circle No. 12—Page 207

Hardness Tester: Barber-Colman Co., Loomis & River Sts., Rockford, Ill.—Hand hardness tester, designed for use on plastic or nonferrous metal parts, may be used in any position, in any area which will permit entrance of the operator's hand. It is suitable for the measurement of any smooth surface material which

is softer than Rockwell E-105. The hardness readings of this instrument are, in essence, a measure of a needle indentation in the material. This indentation is measured between the needle point and the protective sleeve. A conveniently located dial indicates material hardness.

For More Details Circle No. 13—Page 207

Winch: St. Anthony Machine Products Co., 2424 East Franklin Ave., Minneapolis 6—Portable electric winch is designed to provide mobile lifting and pulling power for many materials handling jobs. Available in various models, the unit provides

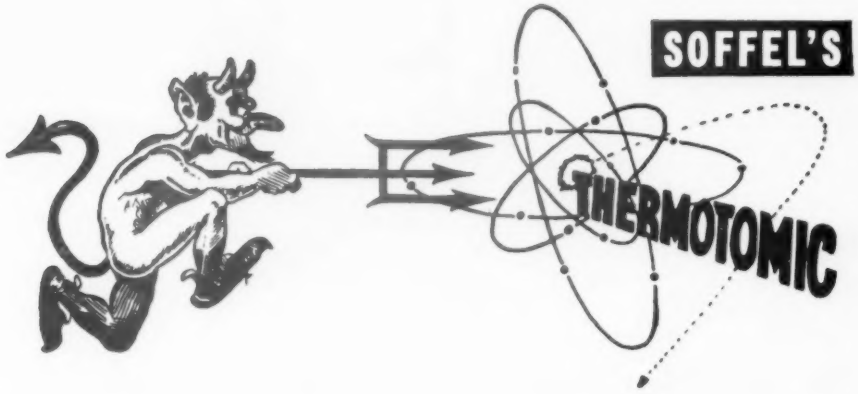


a line pull of 500 to 1500 lb at speeds of 55 to 220 fpm. Double-reduction spur gears, fabricated from high-tensile steel, convert the output of a high-torque, repulsion-induction motor to a constant speed and power ratio on the drum. The reducer is coupled to the motor direct and is totally enclosed to permit higher gear efficiency and quiet operation while

(*Continued on page* 212)

SOFFEL'S
EXOTHERMIC COMPOUNDS
Keep Feeding Metal Molten

270 pounds solid monel casting made by direct pouring through Thermotomic strainer core under feeding head. Chills were eliminated—no shrink at the flange.



THERMOTOMIC* FOR ALL METALS AND ALLOYS

Soffel's Thermotomic Compounds maintain feeding metal in heads or risers in the fluid state up to 50% longer, ensuring the reservoir of feeding metal remaining molten until all sections of the casting have solidified. Thermotomic Compounds can be molded into any desired shapes and baked like ordinary sand cores. Thermotomic is used as ring inserts under the risers or feeding heads, or as strainer cores under the head or riser for direct pouring through the feeding heads, or as facing inserts where it is desirable to maintain fluidity of metal in the mold at those points where rapid cooling may cause piping, shrinkage or segregation. Temperatures up to 3500° F. are obtained. It permits the use of smaller size feeding heads and risers, and their removal without cutting or burning. The reduction in riser dimensions can produce savings in feeding metal up to 50% and more. Chills can be eliminated in many instances and better castings produced through improved grain structure and increased tensile strength and elongation. Soffel's Thermotomic Compounds are available for all metals and alloys, and should be used in conjunction with Soffel's Carbon Free Liquidizer for best results.

Soffel's Carbon Free Liquidizer is a scientific development for replacing common carbonaceous "head compounds" or "pipe eliminators" used to control shrinkage in the production of ingots and castings of ferrous and non-ferrous metals.

*PATENTED

SOFFEL'S CARBON FREE LIQUIDIZER

Soffel's Carbon Free Liquidizer is different from ordinary head compounds in two ways: It is CARBON FREE, thereby eliminating carbon pick-up in alloy irons and stainless steels, and it is EXOTHERMIC. Carbonaceous materials, regardless of their composition, may cause pick-up, segregation, non-uniform grain structure, and hard spots under risers and in castings. They contribute no heat value whatever and serve only to insulate the metal in feeding heads and risers. SOFFEL'S CARBON FREE LIQUIDIZER, on the other hand, is entirely free from carbon in any form and will NOT contaminate any metal or alloy in any way. In addition, when applied on the heads or risers, the LIQUIDIZER reacts with itself exothermically producing a temperature above 3200° F. This heat actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft, insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the high temperature of the feeding metal in the heads or risers.

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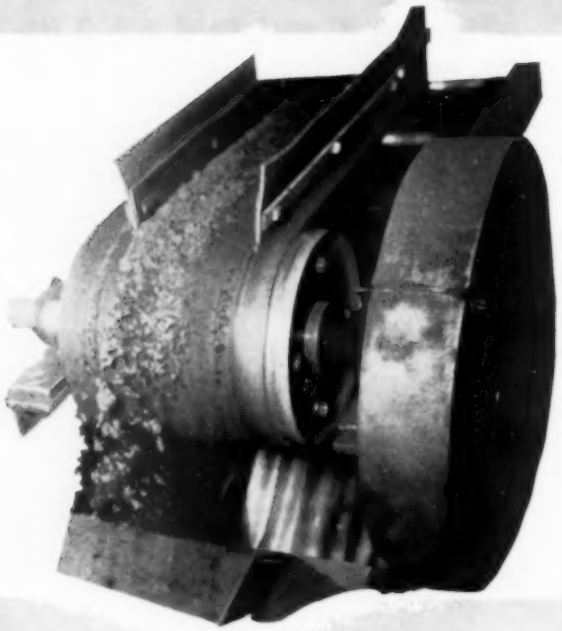
MAGNETIC PULLEYS?



Dings Non-Electric Perma-Pulley Answers today's Requirements

It's the Modern Way to Remove Iron from Foundry Sand... to Handle Separation of Ferrous and Nonferrous Scrap...

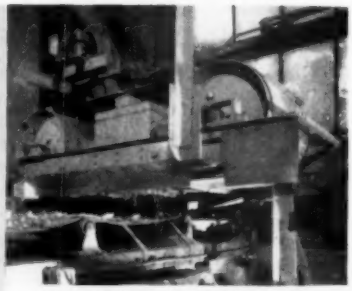
It's...

- NON-ELECTRIC
- SELF ENERGIZED
- PERMANENT
- COMPLETELY AUTOMATIC

FOR new installations or replacement of old, the Perma-Pulley is magnetic separation at LOWER COST. No operating expense... no maintenance ...no electrical accessories... its great power is CERTIFIED... its magnetic permanence is GUARANTEED—just install it and forget it. The Perma-Pulley carries *every* assurance of maximum iron removal.

Learn the facts on why Dings Perma-Pulley is the economical answer to the vast majority of foundry problems. SEND for BULLETIN C-1007A.

DINGS MAGNETIC SEPARATOR COMPANY
4708 West Electric Ave., Milwaukee 14, Wis.



For extra heavy burden depths, for heavier belt loads at higher speeds, FOR MAGNETIC SEPARATION WHERE OTHERS FAIL, it's the Dings Self-Cleaning Rectangular Magnet. None more powerful.

The Dings Non-Electric Perma-Plate magnet is the most inexpensive answer to many magnetic separation requirements. It's the lightest, most powerful non-electric magnetic separator available.

Dings Certified MAGNETIC STRENGTH

All Types of Electric and Non-Electric Magnetic Separators for Every Purpose

(*Continued from page* 210)

running in a continuous oil bath. One lever controls both the mechanical brake and reversing switch on the motor.

For More Details Circle No. 14—Page 207

Mask: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32—Improved mask may be worn over prescription glasses and is designed to offer protection in gas welding, cutting and brazing operations. Headgear and cross strap over top of head are made of extruded plastic, which is moisture proof, will not shrink or warp, and may be sterilized. Mask is adjustable in circumference and height to provide proper

fit. New headgear pivot assembly is semipermanent; tension is locked in at the factory. The mask takes standard size 2 x 4 1/8-in. lenses available in federal specification shades from 3 through 6.

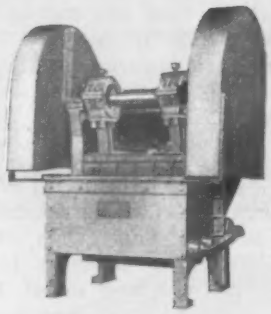
For More Details Circle No. 15—Page 207

Electrode: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—Electrode for welding manganese steel may be used with alternating or direct current to produce long life welds without cracking. The electrode is designed to withstand high impact and has Rockwell hardness of C 26-34, increasing as it work hardens. Its uses include restoring damaged and worn manganese steel equipment of all kinds and salvaging manganese steel castings. Electrode is available in sizes 3/16, 5/32 and 1/8-in. The companion rod for torch welding comes in 3/16 and 1/8-in. sizes.

For More Details Circle No. 16—Page 207

Pouring Device: Knapp Foundry Co., Boston St., Guilford, Conn.—One-man pouring device is said to offer advantages in easier crucible handling, less waste metal, and lower accident risk. It is designed to permit one man to control the crucible.

(*Continued on page* 214)



Newaygo Core and Refuge Crusher quickly returns its cost in salvaged material. It also crushes slag for iron reclamation, separates gaggers and rods for re-use.

Newaygo Aerator efficiently and economically tempers, cools and blends foundry sand to a uniform consistency. Made in sizes for any sand handling system.

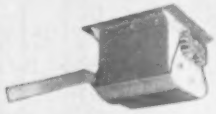
Newaygo Foundry Turntable — Standard sizes 8' to 24'. Segmental construction. Interchangeable gear sections. Variable speed drive. Underpan with plows handles spillage through grates.

Put your floor space to work More Efficiently with NEWAYGO equipment

You can get more work from every foot of floor space in your foundry with Newaygo equipment that's designed for your specific requirements. A single new machine often increases the overall productivity of your entire foundry. Work flows through each operation at the same high speeds. There is no one machine too big or too small. Every machine is the right size and has the right capacity for the job *you* have to do.

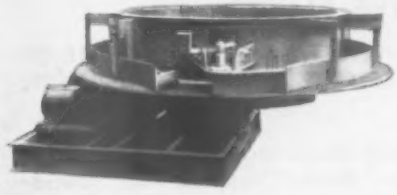
Ask Newaygo Engineers for recommendations that will lower your costs and increase your profits. There's no obligation of course.

The Handy Sandy eliminates hand shoveling for molders and increases their production with this unit, the molder just reaches overhead and the sand drops into flask.



Newaygo Sand Gates — double undercut type. Available for all bins and hoppers. Geared for easy operation. Hand, counterweight or air operated.

Newaygo Mill cuts costs for large users of sand. Salvages sand lumps from screens, separates non-magnetic tramp material and metal which escapes magnetic separator. For systems up to 120 tons per hour.



Newaygo Rotary Plate Feeder supplies an even, controlled sand volume. Readily attaches to tanks and bins. Two sizes — capacities up to 75 tons per hour.

NEWAYGO ENGINEERING COMPANY

NEWAYGO, MICHIGAN

Manufacturers of NeWay Mold Handling, Sand Handling and Conditioning Equipment

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- MOTOR CHAPLETS
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  (Plain or Perforated)
- FOUNDRY NAILS
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CRESCENT FUSETITE CHAPLETS ARE MADE ACCURATE OF PROPER ANALYSIS MATERIALS FOR THE FUSING-IN PROCESS.

Being the Originators and Manufacturers of Radiator, Shoulder, Double Head and Motor Chaplets, Your Foundry benefits by our Chaplet Manufacturing experience since 1889 for the leading Stove, Radiator, Boiler and Motor Foundries.

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Crescent Brass & Pin Company

5766 TRUMBULL AVE.

DETROIT 8, MICHIGAN

(*Continued from page* 212)

He can pour as little as a teaspoonful or the entire contents of the pot quickly, accurately and with assurance that the crucible will not pitch forward and fall on the flask. The device is designed to permit control of pouring with one hand, freeing the pourer's other hand for holding back the dross.

For More Details Circle No. 17—Page 207

Permanent Mold Machine: Centrifugal Casting Machine Co., P. O. Box 947, Tulsa, Okla.—Permanent mold casting machine is designed for use with any metal. Production of 20 to 40 casts per hour can be obtained, depending upon the size and type of casting poured. The machine will handle mold sizes up to 22

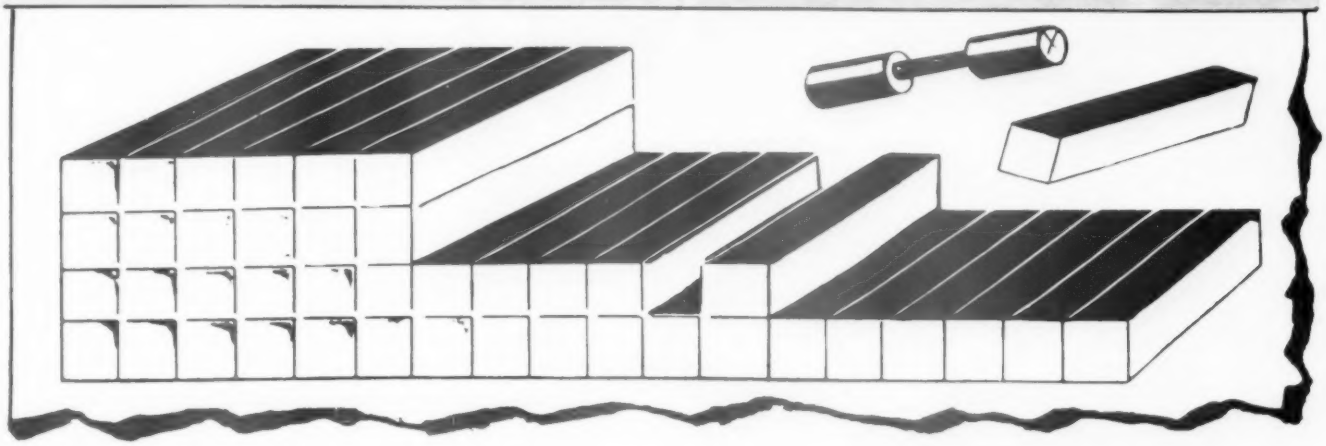
in. wide and 26 in. deep. Castings weighing up to 100 lb can be cast. A feature of the machine is that a core may be placed in the drag half of the permanent mold while the parting line is in a horizontal plane. The mold is closed and rotated to pouring position. After pouring, the mold is rotated back to horizontal position and the cope raised. All machine operations are performed pneumatically. The machine operates on 80-psi line pressure; air consumption at 30 castings per hour is 6 cfm free air. The machine is supplied with all accessories such as permanent molds, coreboxes, arbors, spraying equipment and spray wash. All molds supplied are prepared and tested by actual casting operations before shipment. Detailed directions for production of castings also are furnished.

For More Details Circle No. 18—Page 207

Plastic Refractory: North American Refractories Co., 1012 National City-East Sixth Building, Cleveland 14—A new slag-resistant plastic refractory is said to increase the life of installations having slag

(*Concluded on page* 216)

If You Want the QUALITY of the TEST BAR in Your Castings— *Use* FRONTIER 40-E ALUMINUM ALLOY!



ORDINARILY the physical properties of an aluminum-alloy casting are less than those of a separately-cast test bar. But because of the special qualities of FRONTIER 40-E — the *non-heat-treated* aluminum alloy — you can be sure that *the same high qualities which show up in the test bar will appear uniformly throughout a large casting.* The following tables tell the story:

40-E Step Block Casting Cut Into 42 Test Bars—Physical Properties of each Shown in Squares.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Y.S.	22.5	20.0	21.2	20.6	20.5	22.0	20.8	21.0	21.8	22.5	23.0	23.4	23.0	25.0	23.8	22.5	23.5	24.6
T.S.	38.3	33.0	33.1	32.7	33.8	36.0	33.8	32.5	33.5	34.5	34.0	37.2	37.8	39.0	36.8	36.5	36.7	40.0
El.	12.5	10.0	6.0	4.0	7.5	7.5	8.0	7.0	7.0	7.5	7.0	8.0	8.5	8.5	7.5	8.0	7.5	10.0

SEPARATELY-CAST TEST BAR PROPERTIES		
Nat. Aged 21 days	Y.S.	23500
	T.S.	36600
	El.	7.5

	30	29	28	27	26	25	24	23	22	21	20	19
Y.S.	22.0	23.0	22.5	21.5	22.5	23.5	22.5	43.5	23.5	23.8	22.8	23.8
T.S.	36.3	35.3	35.3	35.0	35.0	37.3	34.5	32.0	32.5	32.5	35.0	38.3
El.	10.0	6.0	9.0	7.5	7.5	6.0	5.0	5.0	5.0	5.0	7.5	7.5

	31	32	33	34	35	36
Y.S.	23.0	22.8	22.5	24.0	23.5	23.0
T.S.	36.3	33.3	32.5	32.5	36.3	39.0
El.	8.0	5.0	5.0	5.0	7.0	8.5

	42	41	40	39	38	37
Y.S.	23.3	23.7	23.0	23.2	23.0	22.5
T.S.	33.2	37.1	36.4	37.3	38.0	40.8
El.	3.0	8.0	6.5	6.5	11.0	11.0

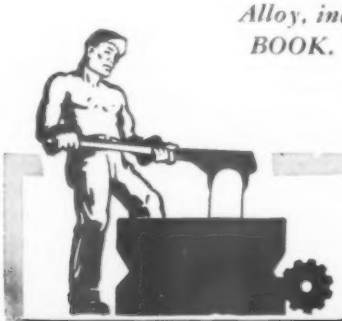
Properties of Casting (based on tensile strength readings)

	Maximum	Minimum	Average
Y.S.	22,500	22,500	22,700
T.S.	**40,800**	**32,500**	**35,500**
El.	11.0	5.0	7.5

Write TODAY for full details about Frontier 40-E Aluminum Alloy, including FREE DATA BOOK.

40-E Meets These Government Specifications:

U. S. Army-Navy Air Corps	AN-A-17
U. S. Navy, Bureau of Aeronautics	AN-A-17
U. S. Navy, Bureau of Ships	46A1F Class 1 (Int)
A. S. T. M.	B-26-46T-ZG41
S. A. E.	310
U. S. Army Ordnance	AXX-1348



FRONTIER BRONZE CORPORATION

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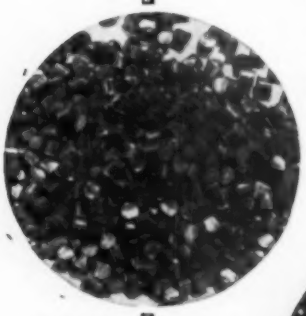
20th Century DRAWN STEEL Shot

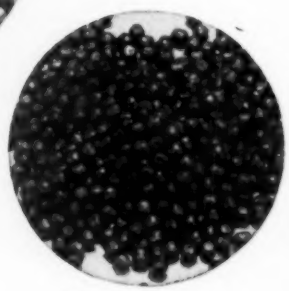
● NEWEST DEVELOPMENT FOR BETTER AND MORE ECONOMICAL PEENING AND BLAST CLEANING.

BETTER because the pellet size and mass remain uniform many times longer than with other types of shot. And it is extremely durable, outlasting conventional hard iron shot 8 to 1 and cast steel shot at least 2 to 1.

MORE ECONOMICAL. Abrasive purchases are greatly reduced, there is less freight and freight handling cost, and less equipment wear and maintenance.



Original Form



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Main Office and Plant: 887 East 67th Street, Cleveland 8, Ohio

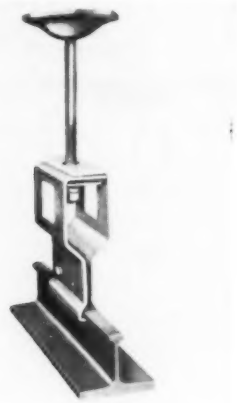
Howell Works—Howell, Michigan

(*Concluded from page* 214)

erosion problems. The material is intended for use in ladle linings, for spouts, breasts and wells of cupolas, or wherever high resistance to solution from slags is necessary. The refractory is said to perform best when in contact with molten metal or where reducing conditions exist. However, under strongly oxidizing conditions the properties of the material are those of super duty plastic with high refractoriness and good resistance to slag attack and spalling, it is claimed. The material comes cut into 2-in. slices ready for installation and may be pounded into place with a machinist's hammer or small air hammer.

For More Details Circle No. 19—Page 207

Monorail System: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Monorail system is designed for overhead handling of lighter loads or



shorter spans. The new system is interconnectable with heavier conventional monorail systems. It consists of a one-piece rail section made of high-carbon steel, which, with its hangers, is flexibly suspended to eliminate torsion on the hanger rods and to equalize wheel loads.

For More Details Circle No. 20—Page 207

Adhesive: Armstrong Products Co., 425 North Broadway, Burket, Ind.—Thermosetting resin compound has been developed to join metals, glass, ceramics, plastics, wood and numerous other rigid materials to themselves and to each other. Strength value tests often have proved the adhesive to be stronger than the materials bonded. The resin mixture contains no volatile solvent and is said not to shrink or swell upon hardening. The adhesive is supplied in two parts—a resin composition and a liquid activator—which are mixed together immediately prior to use. No primer coating or open assembly drying is required. Repair of broken aluminum castings is included among its applications.

For More Details Circle No. 21—Page 207

Casting Grinding Balls Continuously

(*Continued from page* 73)

matic core kickout mechanism with four adjustable vertical pins lifts the core plates from the box. These pins are set so that the bottom of the core plates will lack ¼-in. from clearing the top of the corebox. With the cores in this position, they can be slid from the core plates, the plates remaining in position to prevent sand from dropping into the corebox. An illustration of the core press is shown in Fig. 5.

Permeability of the sand used for the pouring track cores can be lower than that ordinarily employed in steel foundry practice. Bentonite is used as the bonding agent, and the bond and moisture content is held as constant as possible to prevent blowing of the molten steel as it flows in the trough cores. When the sand comes from the casting machine and the shakeout, it is taken to a storage pile to cool, then over a magnetic separator to remove the tramp steel and then into a muller type sand mixer. Bentonite and water are added and the batch mulled for 6 minutes. The strongly bonded sand will come from the muller in lumps so that a sand areator or riddle is used to break these lumps before the sand is in condition for the core press.

Mull the Core Sand

Hardness of cores is dependent on the amount of sand in the corebox. Since dry sand is almost incompressible, and a strongly bonded fluffy sand will compress a great deal, it follows that the core sand should be finish mulled to have a consistent bond and water content. The corebox is made shallow so that the correct amount of sand can be struck off the top of the box. The cores should be just hard enough so that they can be handled without breaking, since they will be pressed tight on top of the copper molds to conform to irregularities in the mold and to prevent runouts underneath the cores.

A simple rubber conveyor, 24 in. wide and 20 ft long, is utilized to store the cores as they come from the press and carry them to the setting station at the machine. The conveyor is motor driven with push-button control at both ends so that movement may be controlled when loading at the core press or unloading at the casting machine.

When operation of the machine is controlled by batch furnace melting, cores for casting one heat of steel are

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NORMALIZED Shot and Grit

MANY REPEAT ORDERS PROVE BROAD FOUNDRY PREFERENCE FOR THIS OUTSTANDING MALLEABLE ABRASIVE

20th Century Normalized blast cleaning abrasive is definitely more economical than ordinary shot and grit. It is stress relieved and there is practically no shattering.

YOU WILL OBTAIN AT LEAST TWICE AS MUCH SERVICE—and greatly reduce freight and freight handling cost.

YOU WILL REDUCE EQUIPMENT WEAR and maintenance from 50% to 75%.

● **EXCLUSIVE SCREENING PROCESS** insures greatest uniformity in grain sizes.

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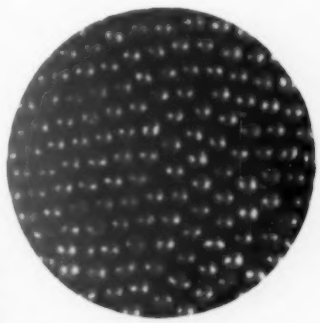

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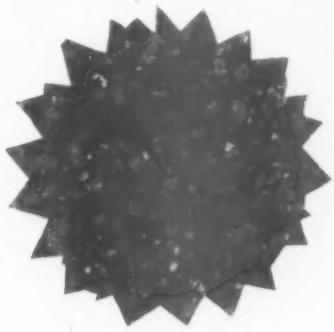

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CAPEWELL FOUNDRY CHILL NAILS

For the most satisfactory results in casting manufacture, use Capewell Foundry Chill Nails. Because they are made of the finest quality soft iron they fuse quickly into the casting. In the Capewell line you will find a foundry nail for every purpose and size of casting. Sharp points or blunt ends... regular, slim, or extra slim blades. Send for samples. No obligation. Simply write to . . .

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For sawing risers and gates, for trimming castings, order Capewell Hack and Band Saw Blades. Capewell's advanced heat-treating produces faster-cutting and longer-lasting blades.

1881 CAPEWELL

THE KEY TO ECONOMY

made up when the casting machine is idle by the two men who set and squeeze runner cores when the machine is operating.

Cast steel balls are produced of the following analysis: C 1.10 to 1.40; Mn 0.60 to 0.80; Si under 0.60; Cr 0.90 to 1.25; Mo 0.20 to 0.30. Metal is melted in an acid-lined electric furnace batch operated. In operating the machine it has been found advisable not to have heats over 4000 lb, since larger heats may become cold before all of the metal is poured. High-carbon scrap, such as rails, springs and a small amount of motor blocks, is desirable for the charge. Iron borings can be used instead of motor blocks, provided the borings are shoveled into the furnace just before all of the steel is melted. Low-carbon scrap can be used if some type of carburizer is placed on the furnace hearth before the charging. Steel can be boiled with iron ore, but it has been found more satisfactory to use an oxygen lance or jet. The oxygen produces a quick, uniform boil and the reaction can be stopped on each heat to give a very good control of the carbon. A Carbometer is used to quick carbon determination. Teapot spout ladles are used in pouring.

Gives Operating Cycle

In making steel balls, it is necessary that the molds open in time to discharge the cast balls at 1600 to 1800° F. The balls are allowed to cool slowly for 5 or 6 minutes before going under an air blast. If the balls cool too long in the molds, or immediately after coming from the casting machine, they may rupture internally. Cooling slowly after removal from the machine is accomplished on a slow cool conveyor. The balls then are discharged onto a covered conveyor provided with heavy duty exhaust fans for rapid, uniform cooling. Both conveyors have variable speed drives.

Temperature of the balls should be under 900° F before they are discharged from the fast cooling conveyor onto a table cooling rack. The cooling rack is large enough so that an eight hour run of balls can be discharged onto one end of the rack, and the next eight hour run on the opposite end. When the casting machine is idle, some of the men can inspect the balls and load them into tumbling barrels.

Experience has shown that pure copper molds provide longest life and most satisfactory results. Pure copper castings free from porosity are difficult to produce, and small additions of alloys in copper lower the heat conductivity and make the

copper less ductile. Because it seems advantageous to have high heat conductivity in the copper molds so that they will not melt when steel is being cast, and as a means of preventing fire checking, the company is using a mold fabricated from a copper casting and pure copper bar stock.

The bar stock usually is purchased in 6-ft lengths of the proper width and depth for the face of the mold. In the machine shop the bar is sawed with a 5° angle on the ends to permit close operation on the circular turntable. The ball impression and gates then are machined out of the bar. The other portion of the mold is a casting which forms both the water jacket and the bracket for attaching the mold to the machine. The casting and the bar stock face are welded together, and then finished by machining. Welding procedure is difficult and it is necessary to preheat the two parts of the mold to a temperature of 1100 to 1300° F before welding. In welding the water jacket on the bar stock, direct current is used and the negative is grounded. Current characteristics provide 150 to 200 amperes at about 40 volts. Copper alloy coated rods are used for the electrodes.

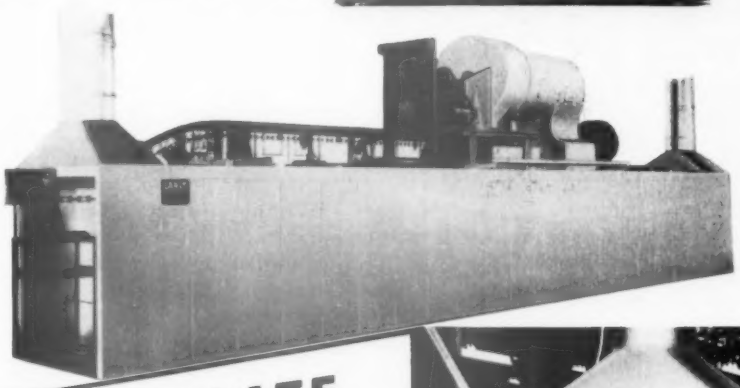
Molds Can Be Straightened

Any copper chill mold utilized in casting high temperature molten metal will shrink gradually on the face, and therefore assume a concave shape. When this distortion is sufficient to cause fins on the casting, the mold is removed and straightened under a press. The company maintains extra molds for replacement while straightening is under way.

Another source of difficulty with copper chill molds is hair-line cracks on the opening of the gate, and also to a lesser extent at the bottom of the ball impression. While these cracks are called fire checks, it is thought that the condition is aggravated by a slight bending of the mold as it alternately expands and contracts on the surface. When these fire checks become sufficiently deep to cause trouble, they are repaired by welding. Again the mold must be preheated to a temperature of 1100 to 1300°F. The current characteristics used are from 175 to 200 amperes at 50 volts with the positive grounded. A carbon electrode and pure copper wire are employed. Pure copper fluxed with phosphorus also has been found satisfactory. Copper alloy welding rods are not utilized in repairing the face of the mold.

The casting machine and the core press were developed and manufactured by P. M. Payne & Co., Denver.

SMOOTHER CORES EMERGE FROM THIS LANLY Continuous Oven for Drying Cores after BLACKING



ELIMINATE Costly INSUFFICIENT DRYING, CORE OVERBAKING, FUEL WASTE, HEAT LOSSES & FIRE HAZARDS with a LANLY INSTALLATION

(Above) Overall view of LANLY Gas Fired Continuous Oven. (Lower Illustration) Close-up of entrance end showing carriers and fume sealing vestibule.

• Profitable improvement in core blacking resulted when this Lanly Continuous Oven was installed in a large modern foundry.

Ideal drying conditions prevail with the Lanly convection heating system that maintains a constant supply of heated air that is closely controlled in temperature, volume and velocity.

Whatever your immediate or anticipated foundry oven requirements may be, you'll be wise to consult LANLY. No expense or obligation to yourself. The chances are excellent that you will benefit in many ways by our broad experience.

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OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
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Cupola Dust Collection

(*Continued from page* 91)

system until it reaches a combustion chamber with a carefully regulated air supply, as in the Griffin system[1], the explosion hazard can be minimized. The Griffin hot blast cupola developed by the Griffin Wheel Co., Chicago, is not a closed top cupola but it provides for the confined removal of combustion gas below the charging door and passage through heat exchangers using both sensible and latent heat.

At this point it is proper to warn that there is little reason to be complacement about the reliability of gas explosion preventive measures in the design or handling of a cupola. The operating crew must at all times be on the alert for signs of trouble, and unnecessary additional points in the system that may give such trouble do not represent good engineering.

Type B-4 is not known to be in use; it would require very close regulation of the exhaust capacity of the fan on the dust collector to keep in step with any variations in airblast quantities. It is included in this list of arrangements to further emphasize a preference for Type B-2 when a suction method of gas removal is desired with a closed top cupola.

Dry vs Wet Systems—A decision for or against the use of water with a cupola dust collection system is primarily the result of a series of considerations whose individual importance must be rated for each foundry. With this in mind, a checklist of items for study has been assembled and is offered here for reference. Included in this list are relevant points discussed elsewhere, together with a few observations requiring no further comment. Some of these points are in the nature of warnings to those who are required to make selections from several designs of the same type of collecting equipment.

Advantages of Wet Systems:

1. Improved collection of the finer fractions of insoluble as well as soluble dust. Better collection is chiefly the result of (a) moist contact surfaces that resist the tendency of dust re-entrainment by turbulent gas; (b) contact of small particles with larger droplets easier to remove from the gas stream by kinetic forces; (c) possibility of increasing the mass of particles by adsorption of water; and (d) reduced volume and velocity

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of gas by cooling, and thereby its particle transport ability.

2. Possibility of removing part of the gaseous sulphur from the stack gas.

3. Cooling effect of water on the collector elements.

4. Quenching of incandescent particles as a fire prevention measure.

5. Practicability of using waste water from other processes, even at temperatures up to 120° F.

6. Possible transfer of sensible heat in the gas into sensible heat of water for use elsewhere in the plant after suitable clarification.

7. Convenience of hydraulic disposal of the dust.

8. Possibility of combining several wet dust collector sediments in a single dewatering installation. This includes the piping of collector sludge into a slag quenching and granulating system.

9. Reduction of the abrasive effect of heavy particles by the lubricating effect of water.

10. Ease of applying water to most types of dry dust collectors, making suitable provision for protection of the cupola charge against drenching when the collector is mounted on the stack.

Disadvantages of Wet Systems:

1. Need of special pumping equipment where water supply is limited, or where available pressure cannot lift the water to the top of the cupola. Note here that with a Type A-3 washer (Fig. 4), water flow must be stopped in case pressure falls too low to sustain a proper throw toward the collector shell.

2. Hardness of water supply, with attendant possibility of troublesome maintenance due to spray nozzle plugging (can be overcome to a considerable extent by proper design of water distribution element).

3. Possibility of a corrosion problem due to excessive sulphur in the fuel; even so, the expense of chemical neutralization may be justified in order to help retain the gaseous sulphur.

4. Possibility of damage due to corrosive mist settling near the stack, especially in cold weather as a result of greater amounts of condensation.

5. Danger of freezing during shutdown periods in severe climate if equipment is of such design that it cannot be effectively drained from all points (proper drainage is both an anticorrosion and antifreezing necessity).

6. Severe local limitations on stream pollution (effluents from dewatering tanks are generally rated as satisfactory for discharge into sewers and streams).

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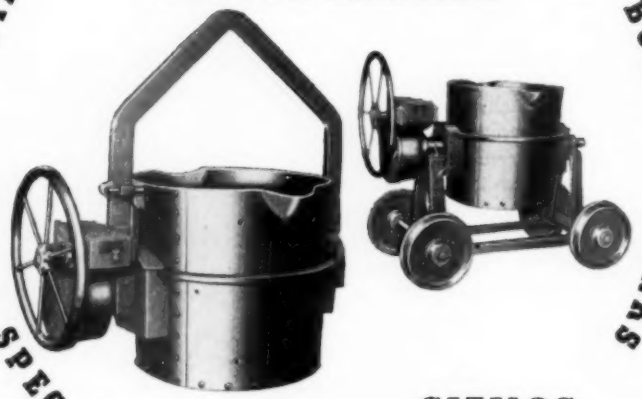

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Advantages of Dry Systems:

1. Retention of sensible heat in the gas for transfer to the blast air in a dry heat exchanger, wherein the latent heat of carbon monoxide also may be recovered.
2. Possibility of recovering both the soluble and insoluble solids in the dry form (though generally considered worthless, except for land-fill purposes).
3. Minimum corrosion activity.
4. No danger of interruption of the melting process if collector is at top of the stack, which might be necessary if preservation depends on water cooling.

Disadvantages of Dry Systems:

1. Necessity of high temperature resistant construction unless equipment is sufficiently large to permit high gas dilution ratios.
2. Difficulties anticipated in handling the collected dust dry, making it advisable to convert it to a sludge before transport in which event a wet system using hydraulic disposal would be an advantage.
3. Inability to reduce the gaseous sulphur concentration in areas where required by regulation. (Reaction chambers or filters packed with alkaline materials or sorbents could conceivably overcome this objection to a dry system, but equipment size and necessity for periodic regeneration would make this method a poor choice for large cupolas).

Dry Systems of Gas Cleaning—The effect of gravity is of special advantage in the control of cupola dust; any particle too heavy to be steadily supported by the upward velocity of the waste gas settles back into the stack, or into an expansion type dust catcher at the top. In other words, the "terminal velocity" of the particle is greater than the upward component of the gas velocity. For this reason, the terminal-velocity-distribution of cupola dust is the most direct measure that can be made to indicate the prospects of retaining the dust in a natural draft collector of the expansion type.

For gas treatment systems using an exhaust fan, numerous dry cleaning devices are available. They may be applied either as single stage cleaners, or as primary cleaners, according to blast furnace practice. They include cyclones, impact chambers, zig-zag baffle arrangements, and down-up expansion chambers of the type described by Kling[3].

Quite recently, an aerodynamic "filter" or louvered cone has been applied on a dry system in this country where the sensible heat is recovered from the cupola gas.

Dry filtration by woven fabrics has always been a good competitor in ap-

plications where the smallest particle sizes must be removed. A serious limitation is the temperature of the gas stream, for it must be kept below the charring or disintegrating point of the fabric. High-temperature-resistant fabrics, such as glass, asbestos, or synthetic fibers, have raised the practical temperature of exposure, and thus have brought more applications into the range of true filtration.

Nevertheless, the ability to remove very fine particulate matter from air or gas by the use of densely woven fabrics brings with it a number of important disadvantages: (1) necessity of a special dedusting or periodic "rapping" mechanism to free the fabric of part of its dust load; (2) necessity of frequent inspection of the fabric and its supporting framework for leaks developed by the rapping process, or for uneven plugging; (3) cyclic variation in the resistance encountered by the gas stream due to build-up of dust on the fabric, which results in cyclic variation in the volume of gas flow.

Removal of Particles

Dry fabric filtration is a superior method of particle removal capable of producing gas suitable for use in combustion engines, or for delivering air clean enough to breathe. It is not likely that cupola gas will receive this kind of treatment for some time to come, and only then if the gas is not wasted directly to the atmosphere.

High-voltage electrostatic precipitation is another gas cleaning process that is usually operated dry. It can be installed as a combination settling chamber and fine-particle trap, but even alone it requires much space. Its well known ability to collect fine particles in the vicinity of 1 micron is a class of performance currently regarded as unnecessary for cupola gas, which is still almost universally exhausted to the atmosphere without any attempt to recover its heat.

Advocates of wet methods have suggested that they eliminate the danger due to falling sparks. It is believed, however, that any good method of dry collection which can stand the heat and will arrest particles only as small as 100 microns, will eliminate the spark hazard by retaining the incandescent particles. Smaller particles are too rapidly cooled in open air to be a real fire hazard.

The primary water supply, as well as the make-up water for a wet dust collector, may be (a) piped from the municipal system, (b) pumped from a nearby stream, or (c) relayed from another water-using process such as

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condensers or dust collectors. Water rates vary from 0.1 to 1.0 pound per pound of cupola gas treated, or from 20 to 300 gallons per minute per cupola, according to the size of cupola and the arrangement of water breakdown and distribution. Evaporation loss will range from 10 to 50 per cent of the water circulated, the higher ratio applying only to the lowest rates of flow; in fact, an excessive ratio of evaporation loss is an indication of inadequate water flow.

In many cases a large proportion of the water delivered to the collector is recirculated from a settling tank or sump, possibly having been treated with soda ash (sodium carbonate) to neutralize the acid or assist in the retention of sulphur dioxide (Fig. 6).

Water pressures are relatively low from the viewpoint of gas cleaning, generally less than 50 psi at the collector. This means that such devices are not classified as "fog" washers, where pressures are generally from 100 to 400 psi. In view of the substantial conversion of sensible heat into latent heat of vaporization, it has not been wise to break the water down too near to fog sizes, as this would result in a second collection problem—that of removing an excessive quantity of fog from the gas. The finer droplets not removed will carry away solid particulate matter until complete evaporation leaves the solids suspended in the atmosphere; the larger droplets will settle to the ground. A small amount of particulate water loss is inevitable, as also is the steam fog that identifies a cupola stack equipped with a gas washer (Fig. 3).

Hold Temperature Down

Water temperature at the downspout from a washer at the top of a cupola is held preferably below 180° F to avoid excessive vaporization. From the viewpoint of heat transfer, the smaller the amount of water required to carry away a fixed quantity of heat at a given rise in water temperature (100 to 160, for example), the more effective is the scrubber as a heat transfer device. This in itself suggests a more intimate mixing of water and gas with a higher potential dust-removing ability.

An estimate of the quantity of heat carried away by the combustion gas is desirable if a study is made of heat absorption and vaporization loss with a wet method of gas cleaning. Those interested in making such computations are referred to the AFS *Handbook of Cupola Operation*, pages 365-373, for a detailed presentation of the method of determining a heat balance for a ferrous foundry cupola. An approximation of the quantity of

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heat in the stack gas when the temperature is known, can be made by assuming a constant-pressure specific heat of ¼ Btu per pound of gas per degree F.

The high water temperatures associated with minimum water rates and recirculation make it difficult to retain sulphur dioxide; from the viewpoint of corrosion control this is an advantage. The few cupola gas analyses that have been made for sulphur dioxide indicate concentrations that are relatively low, less than 250 parts per million by volume. For this reason, the conventional washers on cupolas have not been designed to be effective gas absorbers, and it appears that in most localities this is not necessary. Accordingly, it is reasonable to operate a water recirculating system without attempting to cool the water to a point such as 60 or 70 degrees with the object of increasing solubility of sulphur dioxide.

Make Equipment Accessible

Any scheme that depends on a water distributing manifold above the stack should be designed for easy access to interior surfaces. If not removed periodically, the scale or precipitate that forms within the manifold from hard or recirculated water and breaks loose, will clog the nozzles or distributing pipes.

Since uninterrupted water supply is important, not only from the air pollution standpoint, but also to prevent overheating and warping of the dust separating elements, it is wise to provide dual pumping equipment for emergencies. A drop in the water pressure below a specified level is used to actuate the spare pump switch, and in case both pumps fail to deliver the necessary pressure, the cupola blower may be shut down automatically.

Scrubbing water from cupola washers has been found to be either acid or slightly alkaline, depending on the relative amounts of compounds of sulphur, calcium and magnesium collected, and the rate of recirculation. Gas washing equipment installed at the top of cupolas can be constructed without the use of stainless steel when the flow of water is great enough to flush down all corrosive sediment from the collector, and when the condition of the recirculated portion is checked periodically to guard against the accumulation of high acidity.

In view of the large quantity of solids carried by the stack gas, it is necessary to provide settling pits, tanks, or basins wherein the scrubbing water can deposit its load. In some types of wet collectors, the set-

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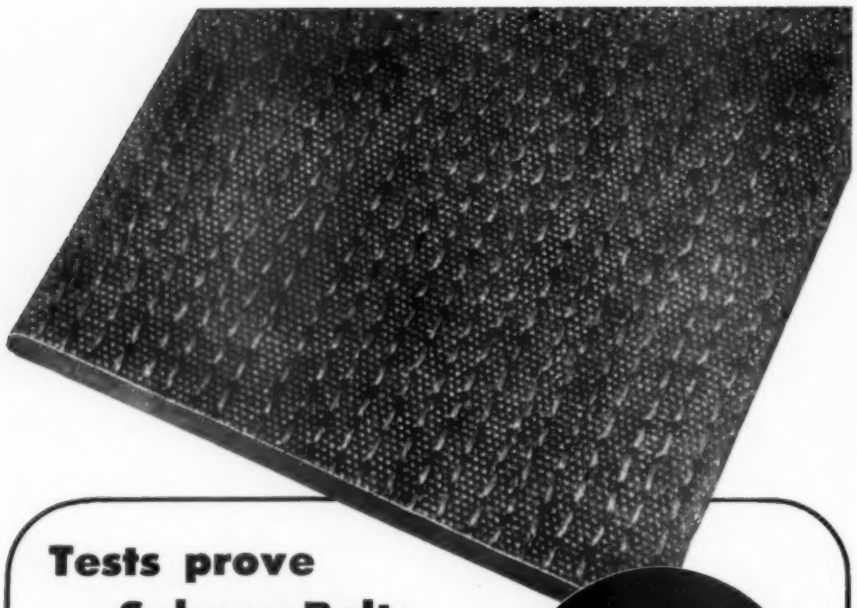

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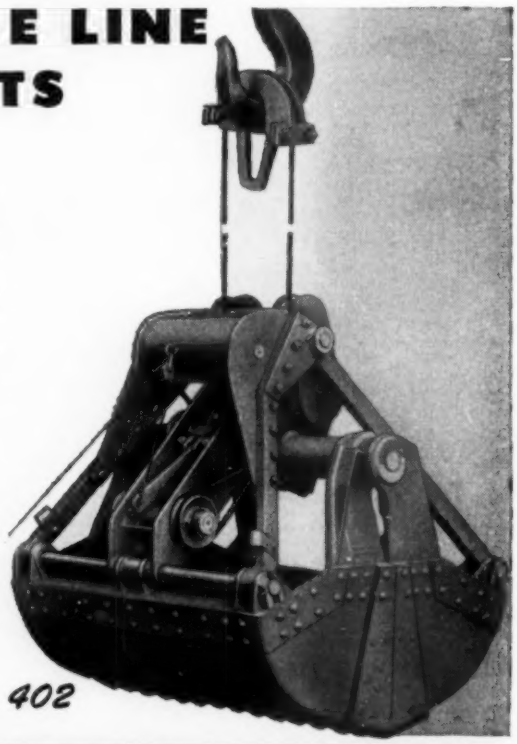

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tling process takes place at the base of the equipment and a mechanical conveyor removes the solids at a sufficient rate to prevent choking of the collector. (Make certain that a water overflow pipe is provided to prevent flooding in case sludge removal equipment suddenly goes out of order.) The clarified waste water is then recirculated, relayed to another water-using process, or piped to the sewer or stream. If a slag quenching and granulating system is available, the water from cupola dust collectors can be run directly into this system, together with scrubbing water from other dust collection systems — for example, an exhaust system installed over the slag spout to capture slag "wool"[1]. The combined sludge is then delivered to the settling pit for separation.

Installations for dewatering or thickening the flue dust sludge have ranged from rather simple pits or "bath-tubs," to conveyorized mechanisms of various designs. For large quantities of dust, the unit thickeners or clarifiers used in related industries can be applied[23].

Both dry dust and sludge removed from cupola gas cleaning systems are currently regarded as worthless, except for land-fill use. If the dust becomes part of the slag, its destination may be either the slag dump, or in granulated form as aggregate for cinder blocks, as road ballast, or rough road surfacing.

Air Blast Conditioning — Attempts to condition the blast air before delivery to the melting zone are not recent by any means. Early literature indicates that recovery of heat from the waste gas for transfer to the blast air has been in limited use for over 100 years, and the possibility of improved operation by the use of a dry blast has been known for at least 50 years.

The advantages of preheating the blast air are now well recognized by foundrymen. When some of the heat required to melt the iron can be obtained from sources exterior to the melting zone, better control can be established over the metallurgical chemistry of the process. The decision to use hot blast is based accordingly on a combination of factors divided between economics and metallurgy.

In the case of foundry cupolas, which are generally operated intermittently or on alternate days, an important disadvantage of depending entirely upon the sensible and potential heat in the waste gas is the time interval between starting the blast and the period of maximum blast temperature. Thus in some foundries,

the blast is heated instead by small auxiliary plants that provide the desired air temperature at the time the blast is turned on. This method also facilitates the installation of air moisture control equipment when the size of the operation or quality of iron warrants the expense.

The possibility of using the waste gas as a source of heat for the blast depends among other things upon the cleanliness of the gas. An excessive dirt load will make the servicing of heat transfer equipment so costly that other sources of heat, either coal, oil, or gas, become more economical. A similar situation occurred years ago during the evolution of gas cleaning equipment for the blast furnace before the recovery of "waste" heat became general practice. Early failures to provide a sufficient degree of dust removal from the gas before passing it to blast heating stoves or to gas engines gave opponents of the innovation a few years of temporary attention.

Requires Low Maintenance Cost

In the present argument, the practicability for modest foundries of recovering part of the heat in cupola gas will depend on developments in economical and effective removal of the finer portion of suspended particulate matter. It has now been generally agreed in the field of dust collection for industrial process ventilation that excessive maintenance requirements imposed by any system of collection are sufficient cause for seeking a more appropriate method of separation. The same applies to the development of dust collection devices for the cupola: the system must operate with the best possible cleaning efficiency for the least possible attention. Air or gas cleaning equipment receives only casual attention at best, and if it needs continuous service, it is only realism to expect it to be soon out of commission.

The foregoing comments are part of the debate on the economics of closed-top versus open-top cupola operation. In a sense, the history of the blast furnace on this point is being repeated, though the circumstances are quite different. We know far more now about the character of dust-laden gases and the technics of separating solids from gases. Nevertheless, it is well to ponder the fact that a good many attempts to control the dust emitted by foundry cupolas have fallen into the category of misguided enthusiasm, chiefly because the nature of the gas cleaning problem has been hastily judged without a sound knowledge of the behavior of contaminated gases.

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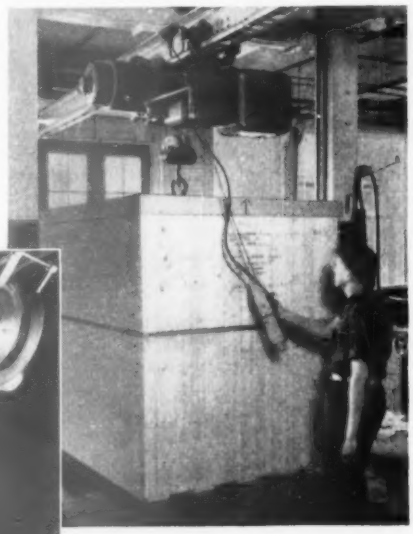

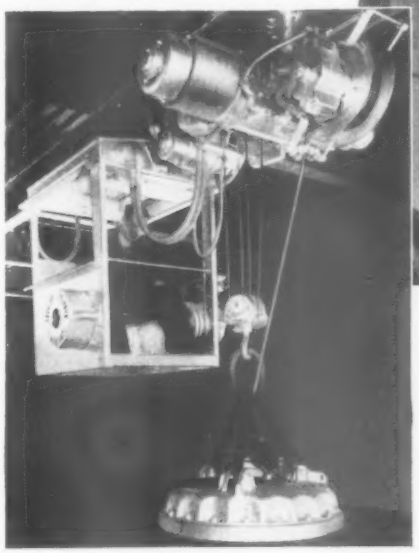

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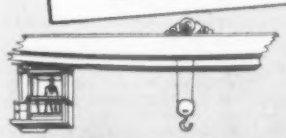

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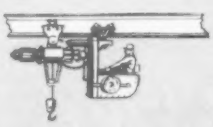

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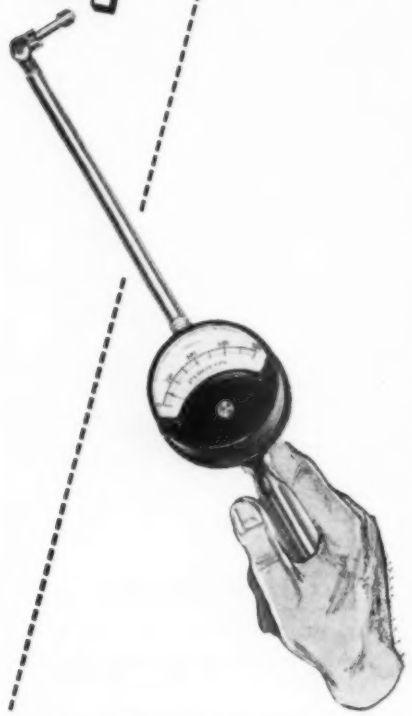

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While the debate gathers momentum on the economics of cupola gas heat recovery versus air pollution abatement, the dust control engineer and the foundry engineer will need to devise means of reducing the quantity of solids discharged into the atmosphere from existing cupolas, and from the many open-top units that are likely to be built for some time to come. Perhaps the dust collection equipment will always be considered accessory to the cupola, but not necessarily so if integrated with a heat recovery system. At least one existing scheme of heat recovery is built into the cupola shell. Originated by W. D. Moore, American Cast Iron Pipe Co., Birmingham, this system does not divert the dirt-containing combustion gas into a heat exchanger[1].

A study of the dust collection problem can be undertaken properly in two phases: the first dealing with possible accessory devices for addition to existing cupolas; the second dealing with the prospects of redesigning the cupola structurally for more effective integration of metallurgical control, thermal efficiency, and air pollution control.

In summary, we present Table III with our knowledge of some of the mass relationships occurring in the cupola process of melting iron. These are selected as the operating indices that have primary significance in the design and study of gas cleaning systems for the cupola.

It is hoped that future work on this problem will be more productive than past efforts, and that important operating economies are in store for the foundry industry in exchange for the expense of dust control equipment. If work in this field can be sufficiently integrated in its effort, we should be able to create for the foundry without much delay both an indoor and outdoor atmosphere properly in step with the environment of other departments of progressive industry.

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Editor's Note: This article was prepared for publication in THE FOUNDRY and in *Heating and Ventilating*, and for presentation at the Michigan Regional Foundry Conference, East Lansing, Mich., Oct. 28, 1949.

Aluminum Group Elects Officers

At its annual meeting held Jan. 17-19 in New York, the Aluminum Association elected R. S. Reynolds Jr., Reynolds Metals Co., Richmond, Va., president for the ensuing year. Vice presidents are: E. G. Grundstrom, Advance Aluminum Castings Corp., Chicago; M. E. Rosenthal, United Smelting & Aluminum Co., New Haven, Conn., and George N. Wright, John Harsh Bronze & Foundry Co., Cleveland. A. V. Davis, Aluminum Co. of America, New York, was re-elected chairman of the board, and Donald M. White was reappointed secretary-treasurer.

Three directors-at-large were elected to serve three-year terms: A. P. Cochran, Cochran Foil Co., Louisville; D. A. Rhoades, Kaiser Aluminum & Chemical Corp., Oakland, Calif., and R. J. Roshirt, Bohn Aluminum & Brass Corp., Detroit.

The association's various divisions also held sessions during the meeting. John T. Watry, Aluminum Casting & Engineering Co., Milwaukee, was elected chairman of the foundry division.

Book Review

Report of a Conference on Cupola and Converter Refractories, paper, 52 pages, 8½ x 10½-in., published by the British Iron and Steel Research Association, Price 10 shillings.

All papers and discussion presented at the association's refractory conference last year are contained in this report. The papers deal with developments in cupola and converter refractories, performance of refractories, relining and patching practices, and the design and operation of cupolas and converters.

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2. Aerating and agitating liquids, in:

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- CO_2 collectors
- Boosting supply to gas engines

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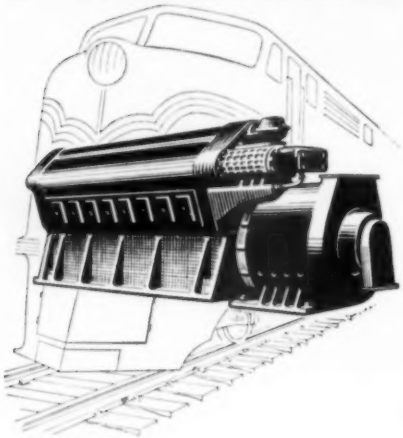

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The Metallurgical LABORATORY

(*Concluded from page* 97)

and foundry foreman in placing permanent gates and risers on the equipment and in rigging the pattern in flasks and on molding machines. These sketches form permanent records for study of the job in question and for laying out similar castings. Permanent gates and risers on patterns reduce variations in casting quality and decrease molding costs.

New developments in gating to produce sound castings have originated from this section. Also, careful study of the gating, risering, and rigging methods illustrated in the sketches has resulted in greater yield through reductions in risers, etc. In turn this has permitted use of smaller flasks and coreboxes, with faster molding and other benefits. This reduces costs, and the savings are passed along to the customer in lower casting prices.

The laboratory office also contains adequate filing space for x-ray film case histories of castings, gating sketches, technical reference files and publications, etc.

The metallurgical laboratory is very compact since all these sections are contained in a total area of approximately 1921 square feet. The laboratory personnel have been trained for flexibility in their positions. Each technician can handle work of other sections capably and the crew can thus be expanded or reduced as conditions require.

This laboratory is designed to be a working laboratory and its chief value is its aid in reducing and solving the problems the production departments encounter. The production departments bring their problems to the laboratory and a satisfactory solution is worked out through the cooperative efforts of the departments. Benefits realized by the company and its customers through the use of this laboratory include:

1. Better quality castings.
2. Reduced casting prices.
3. Less down-time in machining and assembly.
4. Improved customer product.
5. A complete source of information on application of alloys and casting methods to specific customer problems.

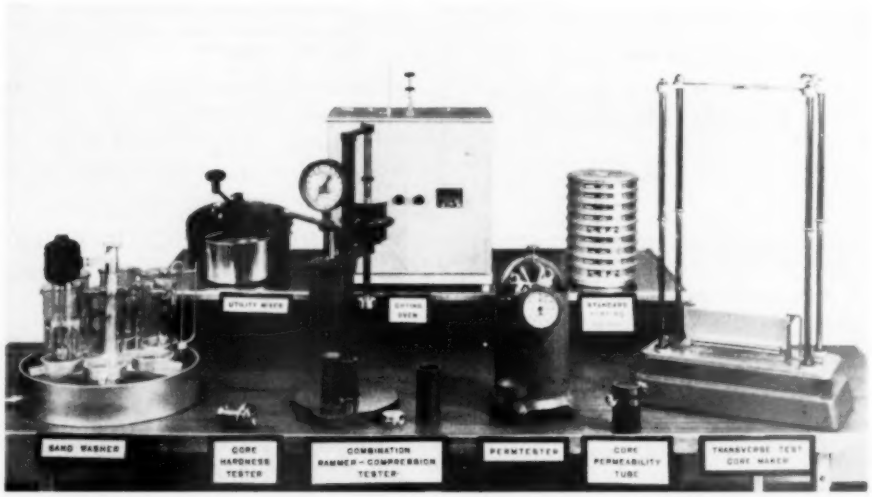
The writer wishes to express his thanks to Kenneth Digney, president, Oberdorfer Foundries Inc., for permission to publish this report.

Sand Testing Units To Be Offered

Claud S. Gordon Co., 3000 South-Wallace St., Chicago 16, has completed arrangements with Harry L. Campbell, consultant on foundry practice, for manufacture and sale of the foundry testing equipment developed by Mr. Campbell. It will be marketed as the Gordon-Campbell foundry testing equipment.

H. L. CAMPBELL

Each of the testing units has been designed to conform to recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society. The line now consists of ten units covering the majority of the tests recommended by the AFS committee. Other units are under development and will be added from time to time. The testing units available at the present time are shown in the illustration below.



Malleable Group To Study Marketing

A market development conference to be held at Northwestern University, Evanston, Ill., on Mar. 22 and 23, has been arranged by the market development committee of the Malleable Founders' Society. W. J. MacNeill, Dayton Malleable Iron Co., Dayton, O., is chairman of the committee.

With the co-operation of the Technological Institute of the university, the conference has scheduled sessions from 9 a.m. to 4:30 p.m. on Wednesday and Thursday, with luncheon meetings both days and a banquet Wednesday night. Eugene Mapel vice president in charge of sales consulting division, Methods Engineering Council, Pittsburgh, will be the banquet speaker on the subject "Master Salesmanship for today's Market."

There will be talks on "Malleable Iron—Its Characteristics, Limitations and Applications" and remarks by design engineers, buyers and representatives of the industry. A feature of the conference will be a typical sales interview illustrating the technique of constructive selling methods. Another session will be turned over to Prof. J. R. Hawkinson of the university's School of Commerce. His analysis of the industry's marketing problems, based on a special study being made by his associates and himself of the problems now confronting the malleable industry, will be presented with suggestions for solutions from a marketing standpoint.

Society vice president, Ralph T. Rycroft, Kencroft Malleable Co. Inc., Buffalo, will open the conference at 9 a.m. Wednesday, Mar. 22, and James H. Smith, general manager, Central Foundry Division, General Motors Corp., Saginaw, Mich., and president of the society, will lead a roundtable discussion toward the close of the Thursday afternoon session.

Employees Honor Company President

Directors and employees of Mueller Brass Co., Port Huron, Mich., honored Fred L. Riggin, company president, at an informal reception sponsored by the company's quarter century club Dec. 3. Approximately 250 guests paid tribute to the man who had worked his way up from an advertising stenographer in 1904 to company president in 1936. A 45-year pin was presented to Mr. Riggin by William R. Walsh, company vice president.

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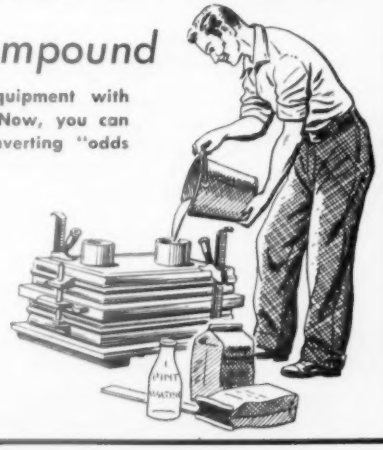

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With the Editors

FREQUENTLY the editors would like to discuss happenings in the industry or present facts about the work of the advertising, circulation or editorial departments of THE FOUNDRY in a rather informal manner which may not fit into any of the regular features or departments of the publication. Therefore, it is believed a column under this heading will help to fulfill that need.

A similar page was used to great advantage during the early war years to discuss the numerous orders and other government actions which had a direct or indirect bearing upon the foundry industry and its work of producing castings to meet the needs of the war effort. During a part of that time the editor was connected with the Tools Division of the War Production Board.

Speaking of the Tools Division brings to mind that every now and then one of the men who served that organization appears in the news. The latest was the appointment of John Jeppson as works manager of the Abrasive Division, Norton Co., Worcester, Mass.

During the past month, highly successful regional conferences were held at Birmingham and Milwaukee. These are two of the oldest regionals, both having been staged each February for many years. Bill Gude covered the Birmingham meeting with a stop over on the way down at Chattanooga. Due to the numerous simultaneous sessions at the Wisconsin regional, Ed Bremer from Cleveland and Erle Ross and Howard Tuttle of the Chicago office covered the sessions, with an assist by A. W. Gregg of the Whiting Corp. George Pope, western manager of THE FOUNDRY, also attended and the editor was present for a few hours.

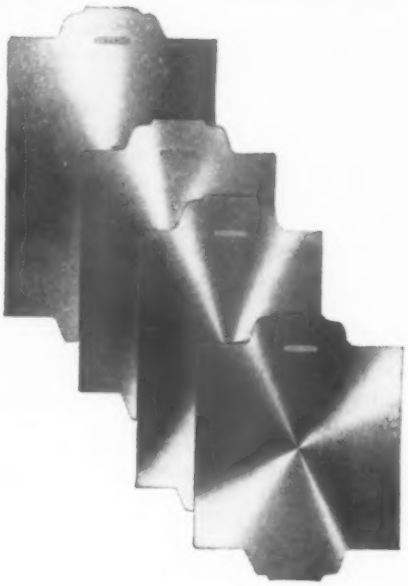
Pat Dwyer came down with pneumonia on Jan. 16, and was convalescing at his home until mid-February. Pat returned to the office on Valentine's Day, but promises to take it easy for a while.

Recently M. F. Leopold, supervising engineer, United States Bureau of Mines, 2622 Interior Bldg., Washington, called Ed Kreutzberg, Washington editor, and stated that firms owning motion picture films depicting foundry operations would confer a favor on the Bureau of Mines by notifying him regarding their content and availability. The Bureau's interest arises from the fact that it is receiving inquiries from many schools and colleges that wish to use movies to give their students a better understanding of molding technique, cupola operations and other details of foundry practice. While the bureau has some 15,000 motion picture films showing manufacturing operations in various industries, it has none on the foundry business.

The editor was privileged to spend two weeks in California during the month of January, speaking before the Southern and Northern California Chapters of the American Foundrymen's Society. Special thanks are due the officers of the two chapters and National Director Bob Gregg and their wives for making it possible to see so many interesting features of Los Angeles and San Francisco. Dave Reeder of Electromet provided a fine tour of San Francisco.

Every day the foundrymen in Cleveland have added proof that the 1950 Convention and Exhibition of the American Foundrymen's Society will be one of the biggest and best in history. Bill Gude of THE FOUNDRY, who is chairman of the Northeastern Ohio Chapter's general arrangements committee, has his groups well organized and making plans for the various affairs. Bill Maloney and Al Hilbron of the AFS get over to Cleveland frequently and each time we gain the impression that the coming show is going to be something extra special. Better plan on being in Cleveland May 8 to 12.

A number of exceptional motion pictures of foundry operations have been made during the past year or so. Recently Lowell D. Ryan, managing director of the Malleable Founders' Society, brought the new film, "This Moving World," down to the Penton Building for a show to the entire editorial and business staffs of THE FOUNDRY, *Steel*, *Machine Design* and *New Equipment Digest*. A short time ago, Max Kuniansky, vice president, Lynchburg Foundry Co., Lynchburg, Va., arranged for a special showing of that organization's new film for the editors of THE FOUNDRY. Thanks to both for a splendid treat. —F. G. S.



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Book Review

Principles and Practice of Flow Meter Engineering, by L. K. Spink, seventh edition, 416 pages, published by Foxboro Co., Foxboro, Mass., Price $7.

This handbook is an authoritative treatise on all phases of flow engineering. It contains information for calculating an orifice, flow nozzle, Venturi tube, Pitot tube, or even a pipe elbow used for flow measurement. The common pressure tap locations are discussed, and data given to correct for odd tap locations.

Liquids, steam or other vapors, and gas, are handled in separate sections. Instructions, curves, and tables are presented in logical sequence, and viscosity corrections are furnished in convenient form.

New additions to the book include equations and curves for calculating throttling orifices to be used at critical pressure drops, a section on measurements of fluid flow in metric units, a description of practical methods of applying AGA Gas Measurement Committee Report #2, and a number of new tables, charts, and examples of typical calculation in flow meter engineering.

How To Handle Isotopes Safely

Recommendations for the safe handling of artificially produced radioactive isotopes in the typical laboratory or small industrial operation are set forth in a new handbook, "Safe Handling of Radioactive Isotopes," issued by the National Bureau of Standards. Specific problems discussed are those of personnel, laboratory design and equipment, hazard instrumentation, hazard monitoring, and transportation of isotopes.

Handbook H42 is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, for 15 cents a copy.

Research Group Issues Report

Armour Research Foundation of Illinois Institute of Technology, Chicago, recently issued its annual report for 1949. Descriptions of more than 200 research projects appear in the 44-page booklet. Sponsored by industry, government agencies and the foundation itself, the projects represent an investment of more than $4 million. The foundation is a non-endowed, not-for-profit scientific research and development organization founded in 1936 to serve industry. Dr. Haldon A. Leedy is director of the foundation.

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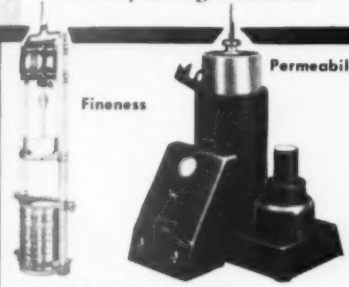

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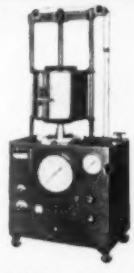

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...TRADE PUBLICATIONS...

For More Details on These Items Use Reply Card—Page 207

LADLES: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Illustrated bulletin FY-163 describes the company's full line of ladle equipment. Complete specification tables list all dimensions and capacities.
For More Details Circle No. 90—Page 207

DESICCATORS: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Folder describes three models of speed desiccators for the rapid cooling of heated samples to room temperature without moisture pickup.
For More Details Circle No. 91—Page 207

POWER TOOLS: Independent Pneumatic Tool Co., 175 State St., Aurora, Ill.—Catalog E-2 covers the company line of universal electric portable power tools. Circular JE-1131 describes the company's 4½-in. universal electric belt sander.
For More Details Circle No. 92—Page 207

TELEMETERING SYSTEMS: General Electric Co., Schenectady 5, N. Y.—Bulletin GEA-5233 describes telemetering equipment for electric power distribution and industrial applications. It contains information on the frequency type, torque-balance type, and photoelectric-type telemeters manufactured by the company. Simple wiring diagrams of typical telemetering installations are included.
For More Details Circle No. 93—Page 207

PRODUCTION FACILITIES: Posey Iron Works Inc., 560 South Prince St., Lancaster, Pa.—Bulletin describes and illustrates production facilities of the various divisions of the company.
For More Details Circle No. 94—Page 207

DOT WELDING: Metallizing Co. of America, 3520 West Carroll St., Chicago—Folder describes dot welding equipment for reclaiming defective castings and repairing cracked castings. It also discusses development and application of the process.
For More Details Circle No. 95—Page 207

VIBRATION CONTROL: Korfund Co., 48-39 F 32nd Pl., Long Island City 1, N. Y.—Bulletin LK-551 illustrates typical equipment installations requiring efficient vibration, shock, and noise isolation.
For More Details Circle No. 96—Page 207

VENTILATORS: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8—Bulletin CU-2 describes portable ventilators which may be operated either by gasoline engine or electric motor for cooling and ventilating areas or withdrawing fumes, gases, vapors or dust.
For More Details Circle No. 97—Page 207

FURNACES: Bellevue Industrial Furnace Co., 2971 Bellevue Ave., Detroit 7—Catalog describes reverberatory tilting furnaces with capacities from 500 to 2000 lb for the melting of nonferrous metals, iron, ferromanganese, copper ferrite and malleable iron.
For More Details Circle No. 98—Page 207

VARIABLE SPEED CONTROL: Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.—Bulletin describes an improved design variable speed control for light horsepower requirements. Description, photographs, rating and dimension tables, and prices are included.
For More Details Circle No. 99—Page 207

ALLOY: Cooper Alloy Foundry Co., Bloy & Ramsey Ave., Hillside 5, N. J.—Folder is designed to present complete data covering the properties and uses of CF-8M (a molybdenum-bearing stainless casting alloy) which is similar in composition to type 316 stainless.
For More Details Circle No. 100—Page 207

ROLLS: Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh 3—In "layman's language" a booklet presents a picture-story of the manufacturing processes required to produce cast steel and cast iron rolls used in the forming of steel, iron, glass, aluminum, brass, rubber and plastics.
For More Details Circle No. 101—Page 207

WELDING RODS: American Brake Shoe Co., 230 Park Ave., New York 17—Bulletin CC-3, in the form of a selector and comparison chart of hardfacing rods and electrode, lists welding rods and electrodes and indicates the type of service for which each is designed.
For More Details Circle No. 102—Page 207

HEATERS: Electromode Corp., 45 Crouch St., Rochester 3, N. Y.—Industrial catalog EC-62 and domestic catalog EC-63 contain descriptions, specifications, illustrations of the units, and show typical installations of electric heaters. They also contain information concerning heating by electricity.
For More Details Circle No. 103—Page 207

MATERIAL POSITIONING: Lyon-Raymond Corp., 6562 Madison St., Greene, N. Y.—Booklet discusses the importance of proper position of material to save unnecessary handling during production operations. It illustrates and describes different types of equipment of various manufacturers for positioning materials.
For More Details Circle No. 104—Page 207

FIRE EXTINGUISHERS: Ansul Chemical Co., Marinette, Wis.—Catalog illustrates the company's complete line of dry chemical fire extinguishers, including piped system, large stationary units, fire trucks, trailers, and others. Catalog also

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Don't chance costly casting losses due to core blowing. Always use dependable, low cost Buffalo Brand Vent Wax and you're sure of speedy, safe core venting when pouring the most intricate castings. Two shapes. 18 sizes. Send for sample today.
UNITED COMPOUND CO.
328 SOUTH PARK AVE., BUFFALO, N. Y.

features charts showing characteristics of approved hand fire equipment and comparative effectiveness graphs.

For More Details Circle No. 105—Page 207

METAL LETTERS: H. W. Knight & Son Inc., 96 State St., Seneca Falls, N. Y.—Catalog of letters and figures designed for both exterior and interior building for patterns, x-ray film marking, etc., covers 56 styles of letters and figures. Sizes, types of metal available, and width and thickness of each style of letter are listed.

For More Details Circle No. 106—Page 207

OPTICAL PYROMETER: Leeds & Northup Co., 4934 Stenton Ave., Philadelphia 44—Illustrated catalog N-33D deals with two special lens assemblies for use with the standard company optical pyrometer for measuring molten steel temperatures during tapping, teeming, and spoon tests, or in the laboratory to make specialized temperature measurements.

For More Details Circle No. 107—Page 207

FLOORING: Master Builders Co., 7016 Euclid Ave., Cleveland 3—Booklet describes company's iron-clad concrete floor having an armored surface produced by imbedding iron particles in the concrete. Such floors are said to wear at least five to six times longer than a plain concrete floor and to have other important advantages. The booklet shows typical installations and gives directions for laying new floors and resurfacing old ones.

For More Details Circle No. 108—Page 207

FREIGHT ELEVATORS: Westinghouse Electric Corp., Elevator Division, E. B. Dawson, 150 Pacific Ave., Jersey City, N. J.—Booklet B-4402 suggests how to integrate selection of freight elevators with the material handling problem. Discussions include: How to determine the lifting capacity and size; types of elevator control systems, how to determine the method of door operation, and layouts for standard freight elevators.

For More Details Circle No. 109—Page 207

FLEXIBLE SHAFTS: Wyzenbeek & Staff Inc., 838 W. Hubbard St., Chicago 22—Catalog 50, containing information on flexible shafts and grinders, also introduces new model single and multiple-speed flexible shaft machines, giving illustrations and operating data. Parts and accessories are illustrated with explanatory details on grinding, sanding, wire brushing, polishing, deburring and other operations.

For More Details Circle No. 110—Page 207

SPROCKETS: Chain Belt Co., 1600 West Bruce St., Milwaukee 4—Bulletin 49-30 deals with stock sprockets for almost all sizes and style of chain except chain using cut tooth sprockets. Dimensions, specifications, list prices, sprocket style and other information are included. Suggestions for selection, alignment and care of sprockets also are given.

For More Details Circle No. 111—Page 207

IDENTIFICATION

In all the world, this thumb-print identifies only one individual —the one who made it. Just as this thumb-print identifies an individual, so FINE GRAPHITE, FOUNDRY FACINGS, CORE & MOLD WASHES, PIPE ELIMINATOR, and CARBON RASING GRAPHITE identify ASBURY GRAPHITE MILLS. We are in the second half of our first century of service to the foundry industry, and we still operate on the principle that a good manufacturer is always identified by good products.

THE ASBURY GRAPHITE MILLS, INC.
ASBURY, N. J.

SELECT A Sterling THAT FITS YOUR JOB!

TUBULAR STEEL FRAME

There's a Sterling Barrow for every type of hauling job, whether it's dry, bulky materials like sawdust or heavy industrial loads like castings or steel parts. Also special barrows for brick, tile, coal, concrete block and similar materials. All barrows are scientifically designed, well balanced and sturdily constructed for a long service life. Choice of wood handles or tubular steel frame, steel wheels or pneumatics. Write for new Sterling Wheelbarrow Catalog No. 61.

(Above) Model S-3 Maximum Capacity 3½ cu. ft. 16 gauge tray, all welded, no rivets, double lapped at corners. Steel channel legs. V-shaped front braces and brace support.

(Right) Model S-19 Maximum Capacity 5 cu. ft. 16 gauge tray, all welded, no rivets, double lapped at corners. Heavy-duty malleable wheel guard.

12 SPOKE STEEL WHEEL

PNEUMATIC TIRED WHEEL

WOOD HANDLE BARROW

IMMEDIATE SHIPMENT

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

Cut Your Sand Costs In Half *with a* NICHOLS Sand Reclamation System

Cut your yearly sand costs by 50 per cent or more with Nichols Sand Reclaiming Equipment. The savings are real and of appreciable size. In many instances the entire cost of a Nichols Installation may be written off in a single year. Reduced sand costs mean lower operating costs.

Let Nichols' qualified engineers review this important economic proposition with you. No obligation, of course. Write us

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A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON JISCO

A "blend" with JISCO is sound metallurgy.

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO

Reduce Use of Chills in Gray Iron Casting

Now all you have to do to get hard chilled iron is add

TELLURIUM

Comes in 1, 2, 3 and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 8-page article, "Use of TELLURIUM In Promoting Chills On Gray Iron Castings."

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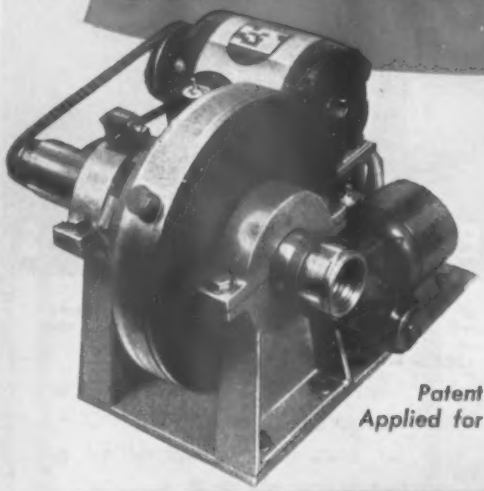
120 BROADWAY • NEW YORK 5, N.Y.

NO MORE GUESSWORK . . .
MAKE YOUR OWN SHOT TESTS!



Patent Applied for

- This amazing new proving machine will give you accurate test of *any* blasting shot or grit.
- Actual blasting conditions are reproduced inside the machine which accurately measures the value of any blasting material and enables you to select the *right* shot or grit for your blasting job.
- Costly waste of "buy and try" is eliminated.
- Ask for a free demonstration in your *own* plant with your *own* shot or grit.

Developed by the makers of "AMASTEEL Trualloy", "PEENBLAST", "CLEANBLAST" and "ALLOY 99"

PRODUCERS OF
PEENBLAST
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ALLOY METAL ABRASIVE CO.

311 WEST HURON ST. ANN ARBOR, MICH.

Fastest possible dressing action on snagging wheels and other large or coarse wheels calls for Desmond Huntington dressers. Five types of handles and three sizes of cutters meet the full range of requirements. Write The Desmond-Stephan Manufacturing Co., Urbana, Ohio, for the complete Desmond Catalog No. 45F.

Desmond
DRESSERS & CUTTERS

IMMEDIATE FUSION WITH MOLTEN METAL PREVENTS LEAKS

Buffalo "LEEK-PRUF" CHAPLETS

In both Double (shown) and Single Head types of "Buffalo" *LEEK-PRUF* Chaplets, the chief factor of efficiency is the exclusive fin design.

Integral with the stem, this extremely thin section protrudes to its full width. There is no recess in the stem to cause weakness. The advantages of this original fin design speak for themselves.

- Positive fusion with molten metal—no chance for leakage.
- Burns in more easily.
- Does not chill molten metal.
- Stem is always full size—hence stronger.

CATALOG NO. 15
Complete information, full range of sizes, on double and single head (round or square) chaplets, as well as many other types.
MAILED ON REQUEST

Trial samples of any chaplets furnished without charge.

Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.

HIGH PRODUCTION MELTING FURNACE with plenty of "PLUS"

ECLIPSE "RB" Crucible Furnace

For heavy foundry production in melting brass, bronze, aluminum and other alloys, this Gas-Fired Eclipse Crucible Furnace meets every requirement—and in addition has many "plus" construction features that make it unusually practical and economical.

+1 **Sturdy Shell Construction:** The furnace shell is heavy sheet steel with welded seams reinforced with flat stock band to eliminate top distortion. Shell bottom is constructed of heavy plate raised off floor to provide proper ventilation under furnace.

+2 **Lining:** The highest quality of refractory materials is used in the furnace lining to give a lining of long endurance.

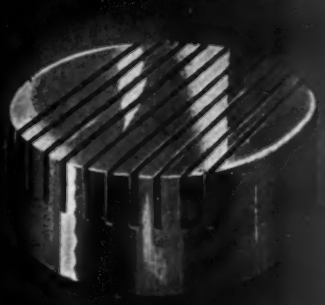
+3 **Cover Construction:** The roll back cover provides a tight-fitting seal between furnace and cover and helps keep floor space to a minimum. Heavy cover frame work and roller rails combine to make a durable cover arrangement.

+4 **Burner and Mixing Equipment:** The burner equipment supplied on this type of equipment consists of a McKee Special Walltite burner designed for high production melting. Proper air-gas ratio adjustment is maintained by using a McKee Low Pressure Proportional Mixer. Regulation of heat imput is easily controlled by the single valve control of mixer.

The Eclipse line of Gas-Fired, Non-Ferrous Metal Melting Furnaces includes a size and type to fit your foundry needs. Write for Bulletin C-2 describing various models of crucible furnaces, with full specifications.

Eclipse Fuel Engineering Company
725 S. MAIN ST. ROCKFORD, ILLINOIS
McKee Eclipse

Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois

PREVENT COMPRESSED AIR STORAGE TANK EXPLOSIONS

DELIVER AIR CLEAN AND DRY

INSTALL A MURPHY TANK TRAP

Automatically removes all condensate (water and oil). Leakproof. Requires no attention, no maintenance. Install it . . . and forget it. Alternate inlets for cramped space installations. Ideal for garage, service station and similar installations. Priced within reach of the smallest compressed air user.

GUARANTEED
to perform as advertised or money refunded.

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Or send **Quickmail Coupon "24."**

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

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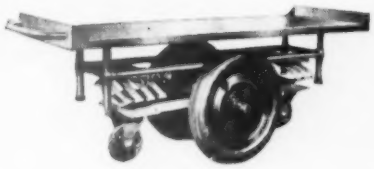
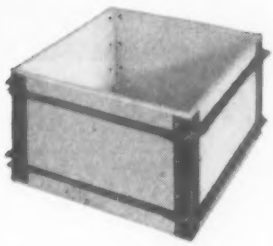
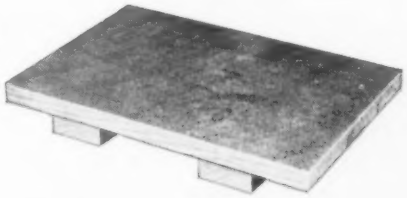


CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage



CMD NON-WARP, NON-BURN SLIP JACKETS



CMD WOOD BOTTOM BOARDS
All sizes and shapes

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With single or double wheels

CMD WOOD FLOOR FLASKS
All sizes and shapes

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TEXTITE AIR SEPARATOR
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.

WRITE TODAY for free copy of illustrated catalog on CMD foundry equipment and specialties, including complete specifications and price lists.

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MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.
Manufacturers of Pneumatic Tools Since 1903
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P-S Corrugated STEEL STACKING BOX

Item No. C-467

A heavy duty corrugated all-steel welded stacking box with corrugated bottom Built with a four way entrance. Crane lugs, stacking brackets are optional. Boxes are built to required specifications, including underneath clearance. Load capacity and color of paint desired, may also be specified.

When Ordering: always give "Item" number

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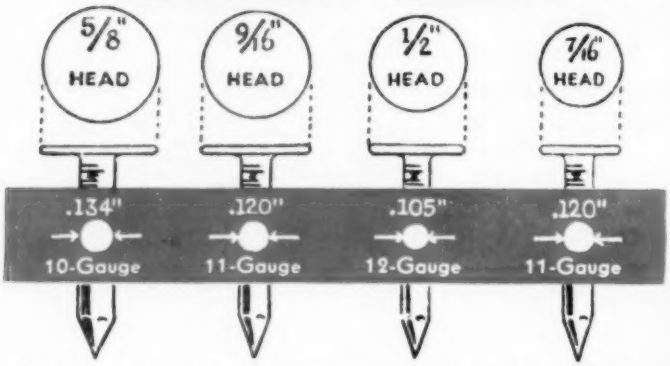
Producers of SUPER HEAD FOUNDRY NAILS



5/8", 9/16" & 1/2" Heads available up to 3 inches in length

Standard Foundry Nails available in all lengths.

All styles of Chaplets Accurately Made for Better Castings

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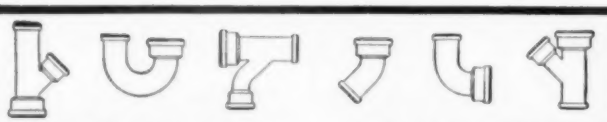

PERMANENT MOLD SOIL PIPE FITTINGS

MODEL F

LOW RATE OF REJECTIONS

HIGH PRODUCTION • HIGH QUALITY
LOW COST WITH UNSKILLED LABOR

IDEALLY SUITED FOR

SOIL PIPE FITTINGS — Practically any shape of fitting or casting can be produced with or without cores.

Low cost green sand or dry sand cores

All Molds are Prepared and Tested Before Shipment

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CENTRIFUGAL CASTING MACHINE CO.
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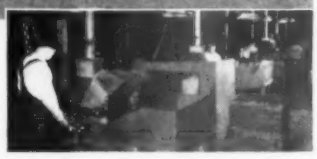
ELECTRICALLY WELDED

TWO U-shaped half links are electrically welded to form stress-free links, by the most experienced chain craftsmen.



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TM Alloy Chain and all attachments receive a controlled heat-treatment. It never requires annealing. It is resistant to shock, grain growth, work hardness.

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TM Alloy Steel Chain is subjected to grueling tests before shipment. It has twice the working load limit of wrought iron or low-carbon steel chain.

CAREFULLY INSPECTED

Each link of every TM Alloy Steel Chain is thoroughly inspected before shipment, by experienced chain craftsmen.

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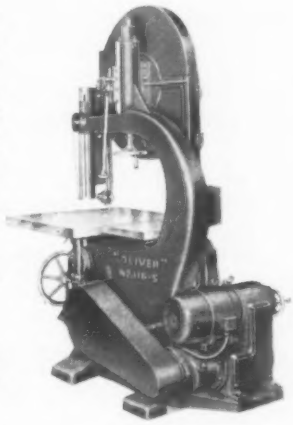
38-inch Metal Cutting

BAND SAW

Saws sprues, heavy or light sections of metals. Also sheet metals, plastics, compositions, woods

This powerful Band Saw is the finest built! Has low-speed geared head direct connected to lower wheel for cutting heavy cross sections. For sawing light sheet metals, compositions, plastics and woods, it can be furnished with a high-speed motor. Extra large capacity under guide. Quick change rim and tire. *Write for Bulletin No. 115-S.*



"OLIVER" METAL CUTTING BAND SAWS ALSO MADE IN 18", 30", 36" SIZES

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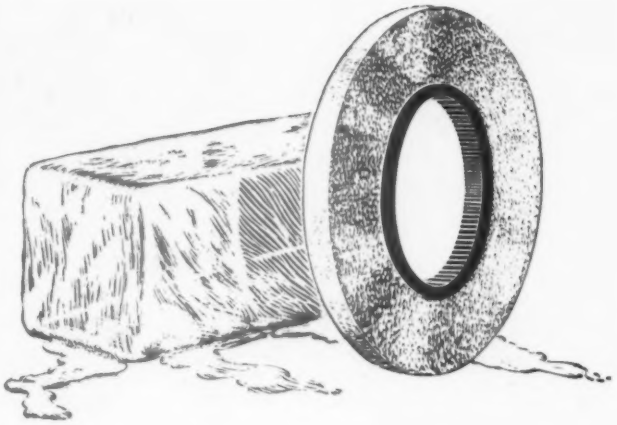

IT'S THE COST OF ICE
(AND GRINDING WHEELS)
THAT HURTS

An electric refrigerator is priced higher than an ice box, but—you don't have to buy a new chunk of ice for it every couple of days. Size for size, Marschke Grinders may be priced higher than many other grinders on the market, but you don't buy as many wheels for them—actual tests prove they will save as high as 40% on wheel costs in many grinding operations.

Think a moment and you'll agree—those wheel bills are your real measure of daily grinding costs!

Well balanced . . . with bearing seats *precision ground and honed* to assure perfect spindle alignment and bearing fit . . . built to absorb the *vibration* which literally "melts away" grinding wheels . . . Marschke Swing Frame Grinders are cheaper in the long run, regardless of first cost.

Grinding wheels don't sell for peanuts; you know, too, that the trick is to remove more metal with less wheel wear. These facts have a bearing on your operating costs! An inquiry will bring you interesting data.

Over 70 specifications of Swing Frame, Floor Stand and Pedestal Grinders—and Buffers . . . 1 HP on up.

Shown: Marschke 24" Swing Frame Grinder.

MARSCHKE GRINDERS

VONNEGUT
MOULDER CORPORATION

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PENN BUCKETS

No. 4-A
Self Dumping

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

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WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

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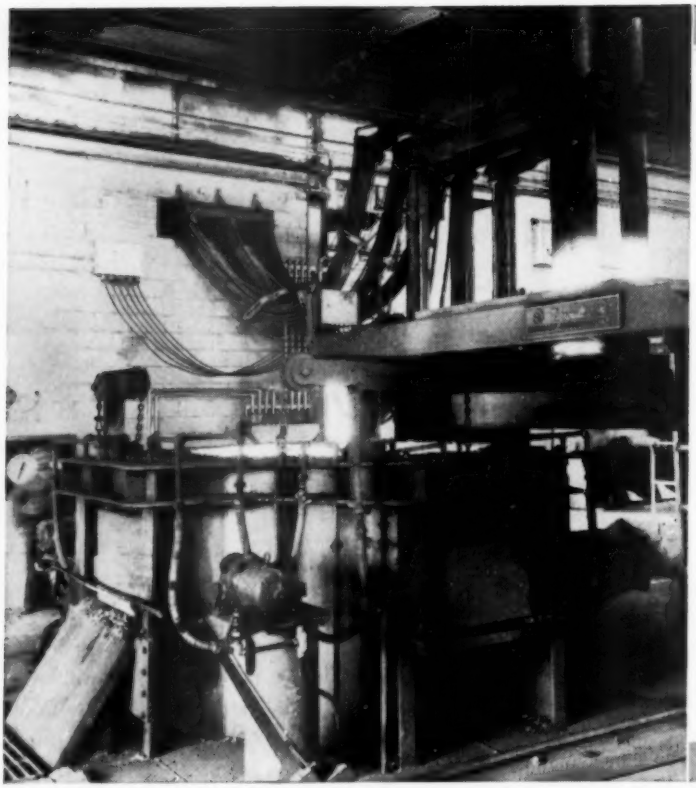

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ELECTRIC MELTING FURNACE

. . . as ever, the dependable furnace for the production of high-grade stainless, alloy and rimming steels.

Precision-built, gear-driven mechanisms for maximum safety and dependability.

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NONFERROUS FLUXES
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PERMANENT MOLD SPRAY

Stocked by the Following Jobbers

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1457 West Ninth St. Cleveland, Ohio

HAMILTON SPRAY GUN

COMPLETE WITH 4½ FT. SUCTION HOSE AND SINKER

$10.00
F.O.B. HAMILTON, OHIO

For spraying molds and cores with any liquid. For cleaning electric motors, gasoline motors and machinery. For laying dust.

Neoprene disc valve. Trigger control. Sturdy brass construction. Length overall 6½". Weight without suction hose and sinker 18 oz. Two nozzle sizes, ⅛" and ¼". Literature on request.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
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JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

Here is a chronology of

RADIUM RADIOGRAPHY *that will greatly interest manufacturers of steel castings:*

1930—First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".
1935—First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.
1938—AFA questionnaire revealed that 8% of steel casting men used radium radiography.
1941—22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.
1946—150 steel foundries rented or leased radium.
1948—200 steel foundries rented or leased radium.

The swing to radium radiography is not accidental: it is a deliberate move by steel casting people who want to improve their production and effect economies. The apparatus is absurdly simple, requires no special training to operate, and, most important, involves no capital expenditure. Illustration shows a large number of castings being radiographed simultaneously. The apparatus may be bought, leased or rented. This is a sound, commercial proposition, and you really owe it to yourself to investigate our claims. Write today for additional information.

PORTABILITY
SIMPLICITY OF OPERATION
SIMPLE APPARATUS
MAY BE BOUGHT,
RENTED OR LEASED.

RADIUM CHEMICAL CO., INC.

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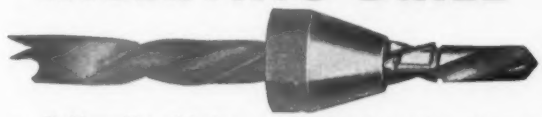
MAUGHLIN
PATTERN LETTERS AND MONOGRAMS

A Hammer Blow Secures Letters To Pattern

The Maughlin Pattern Letters are made of hard aluminum alloy to withstand severe usage and have a number of points on the underside so they can be attached permanently to the pattern.
Industries of the United States and Foreign Countries are using Maughlin Pattern Letters With The Points. Some, who formerly cast their own letters of lead, have found it to be much more economical to use the Pattern Letter With The Points.
Our facilities for making special dies for Monograms & Trade Marks are of the finest, enabling us to quote you extremely low prices.
The COST of the Pattern makers time alone applying lead letters to a pattern, EXCEEDS the cost of the Maughlin Pattern Letter.
Large Stock Carried assuring immediate delivery.

THE H. P. MAUGHLIN CO.
953 Ingleside Ave., Columbus, Ohio
Manufacturers of letters and numbers exclusively for over 30 years

SERVING YOU
in
"Core Blowing Operations"
INSERTING DRILL



• Uniformity of holes • Faster insertion of vent
• Correct Depth

CORE BOX VENTS

DEEP HEAD Wide or Narrow Slots .014 .010
SHALLOW HEAD Wide or Narrow Slots .014 .010
MESH .035

VENT CLEANER

for Cleaning Slots
Made of Tempered Steel, Easy to Use

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TOOLS • PRECISION MACHINED and GROUND PARTS • FIXTURES

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The Favorite Blades of Non-Ferrous Foundries for Over 20 Years

You will profit by using the tougher Atlantic blades for clean, speedy cutting of gates and risers from castings. You can eliminate unnecessary grinding operations—our specially milled tooth construction makes it easier to cut closer to the body of the casting. All Atlantic Metal Cutting Band Saws are guaranteed as to material, workmanship and temper.

Send for Atlantic Band Saw Catalog,
describing foundry cut-off operations.

ATLANTIC SAW MANUFACTURING CO.
Exclusively Band Saw Production

159 BREWERY ST.,
NEW HAVEN 11, CONN.

Measure Foundry Temperatures Accurately . . . at a glance!

Use the Simplified PYRO Optical Pyrometer

Any operator can quickly determine temperatures of minute spots, fast-moving objects and smallest streams with the simplified PYRO Optical Pyrometer. Completely self-contained—no calibration charts or accessories needed. An accurate, DIRECT-READING instrument that will pay for itself many times over by helping prevent spoilage. Weighs just 3 lbs. Available in 5 ranges (1400° to 7500° F.) *Write for FREE CATALOG #80, today!*

For Non-Ferrous Foundries . . . the PYRO IMMERSION PYROMETER

Helps insure low-cost production of SOUND, UNIFORM Castings. Has shielded steel housing which is shock-proof, dust-proof and moisture-proof—withstands roughest handling. "Protected Type" and "Bare Metal" thermocouples are instantly interchangeable, without adjustment or recalibration. Large 4-inch easy-reading dial. Equipped with exclusive LOCK SWIVEL. Ranges: 1-1500° and 0-2500° F. *Write for FREE Catalog #150*

THE PYROMETER INSTRUMENT CO.
New Plant & Lab.
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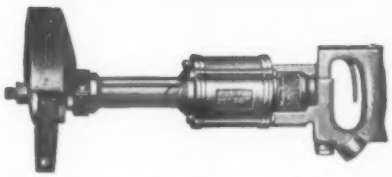

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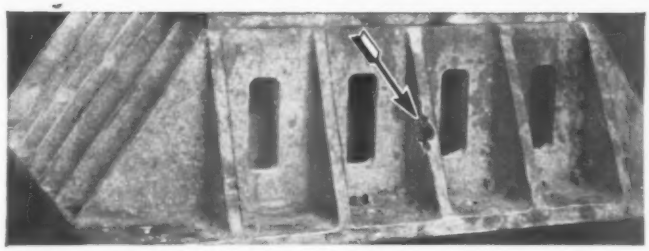

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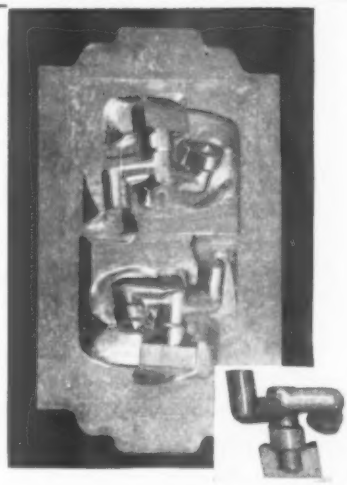

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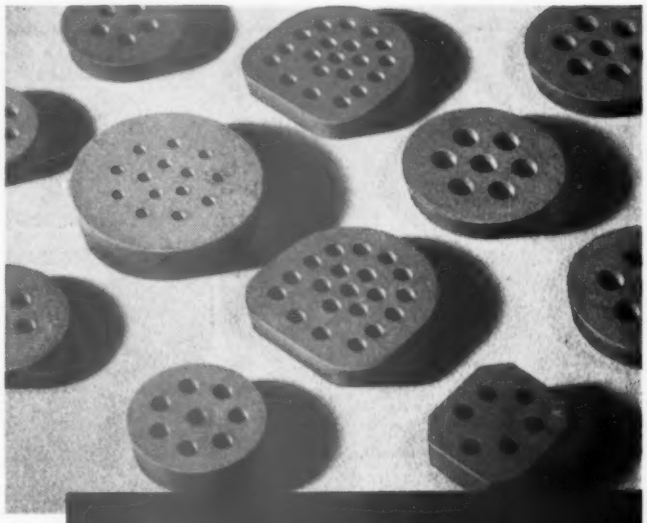

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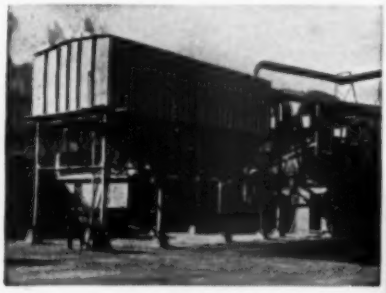

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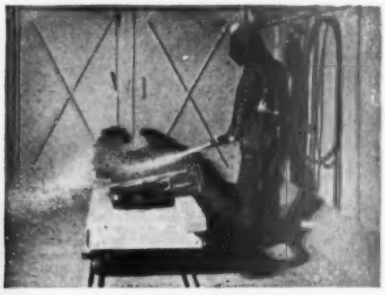

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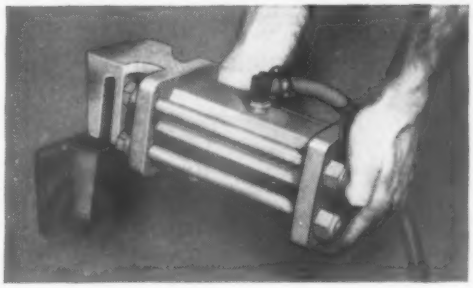

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CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)

Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRANES (Traction or Tractor)

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

American Crucible Co., North Haven, Conn.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Crucible Co., Mermaid Lane and Queen Sts., Philadelphia 18, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES

Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

CRUCIBLE LIFTERS

Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Edwin S. Carman, Lee Rd. at Mayfield, Cleveland 18, Ohio.

Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

CUPOLA LININGS

Carborundum Co., Perth Amboy, N. J.

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

A. P. Green Fire Brick Co., Mexico, Missouri.

Ironton Fire Brick Co., Ironton, O.

Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.

United States Graphite Co., Saginaw, Mich.

CUPOLA PATCHING GUNS

Eastern Clay Products, Inc., Jackson, Ohio.

CUPOLA PRESSURE VALVES

Norwalk Valve Co., S. Norwalk, Conn.

CUPOLA SPARK ARRESTORS

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUTOFF MACHINES (Abrasive)

Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

DARK ROOM ACCESSORIES (X-Ray)

Eastman Kodak Co., Rochester, N. Y.

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

DARK ROOM PROCESSING (Chemical Tanks, etc.)

Eastman Kodak Co., Rochester, N. Y.

DEGASIFIERS

Metalloy Corp., Rand Tower, Minneapolis 2, Minn.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

Metalloy Corp., Rand Tower, Minneapolis 2, Minn.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DEOXIDIZERS (Ferrous)

Carborundum Co., Perth Amboy, N. J.

DESULPHURIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Hercules Powder Co., Wilmington 99, Del.

Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.

Modern Equipment Co., Port Washington, Wis.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES

Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

Kux Machine Co., 3930 W. Harrison St., Chicago 24, Ill.

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

Miller-Taylor Tool Co., 5005 Euclid Ave., Cleveland 3, Ohio.

DIES

City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

DIRECT FIRED HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Pneumatic)

Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Reciprocating)

Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

DUMP HOPPERS

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Bell Aircraft Corp., Niagara Falls, N. Y.

Frank G. Hough Co., Libertyville, Ill.

Kwix-Mix Co., Port Washington, Wis.

DUST ARRESTING EQUIPMENT

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Kirk & Blum Mfg. Co., Cincinnati 25, O.

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

Pangborn Corp., Hagerstown, Md.

Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.

Schmieg Industries, 302 Piquette St., Detroit 2, Mich.

DUST ARRESTING EQUIPMENT (Cont'd.)

Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.

Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS

Pangborn Corp., Hagerstown, Md.

Schmieg Industries, 302 Piquette, Detroit 2, Mich.

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

DUST COLLECTORS (Shake-out)

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

Pangborn Corp., Hagerstown, Md.

DUST CONTROL (Chemical)

Johnson March Corp., 1724 Chestnut St., Philadelphia, Pa.

Pangborn Corp., Hagerstown, Md.

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

DUST RECOVERY SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Kirk & Blum Mfg. Co., Cincinnati 25, O.

Pangborn Corp., Hagerstown, Md.

Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

International Graphite & Electrode Corp., St. Marys, Pa.

National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS

Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Jeffrey Mfg. Co., Columbus 16, O.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Material Handling)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINERING SERVICE (Foundry)

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.

Edwin S. Carman, Lee Rd. at Mayfield, Cleveland 18, Ohio.

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

Herbert F. Miller, 2130 Melrose St., Rockford, Ill.

ENGINEERING SERVICE (Foundry) (Cont'd.)

A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.

Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.

Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

ENGINEERING SERVICE (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

EXHAUST SYSTEMS

American Air Filter Co., Inc., Louisville 8, Ky.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Pangborn Corporation, Hagerstown, Md.

Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.

Schmeig Industries, 302 Piquette, Detroit 2, Mich.

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

FABRICATORS (Metal)

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Delta Oil Products Co., Milwaukee 9, Wis.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

Pacific Graphite Works, 40th & Linden Sts., Oakland 8, Calif.

Stevens Inc., Frederic B., Detroit 16, Mich.

United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)

American Wheelabrator & Fquipment Co., Mishawaka, Ind.

Joy Mfg. Co., La Del Division, New Philadelphia, Ohio.

Pangborn Corp., Hagerstown, Md.

FEEDERS (Rotary)

Fuller Company, Catasauqua, Pa.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Hickman-Williams & Co., Cleveland, O.

Ohio Ferro-Alloys Corp., Canton 2, O.

Vanadium Corp., of America, 420 Lexington Ave., New York, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROPHOSPHOROUS

Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

FERROSILICON

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILM (X-Ray)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Dollinger Corp., 36 Centre Park, Rochester 4, N. Y.

FILTERS (Liquid)

Dollinger Corp., 36 Centre Park, Rochester 4, N. Y.

FIRE BRICK

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.

FIRE BRICK (Cont'd.)

Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
Stevens Inc., Frederic B., Detroit 16, Mich.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati 14, Ohio.

FIRE CLAY

Eastern Clay Products, Inc., Jackson, O.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati 14, O.

FIRE SAND

Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FIRESTONE

Cleveland Quarries Co., 1740 E. 12 St., Cleveland 14, O.

FLASK BANDS

Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASK BUSHINGS

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASK PINS

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASKS (Aluminum)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASK FILLERS

Bartlett & Snow, C. C., Co., 6201 Harvard Ave., Cleveland 5, O.

FLASK FILLERS (Cont'd.)

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK FITTINGS

Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK LIFT MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.
Rietz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.

FLEXIBLE SHAFT MACHINERY

Wyzenbeek & Staff Inc., 838 W. Hubbard St., Chicago, Ill.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

American-British Chemical Supplies Inc., 180 Madison Ave., New York 16, N. Y.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
National Pigment Co., East York St., Philadelphia, Pa.

FLUXES (Cont'd.)

Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Puro-Seal Co., 2323 West Third, Cleveland 13, Ohio.

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY CONSULTANTS

Lester B. Knight & Associates Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY ENGINEERS

Lester B. Knight & Associates Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY LAYOUT & METHODS

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY NAILS

Capewell Mfg. Co., Hartford, Conn.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLIES

Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, Ohio

FOUNDRY SUPPLY HOUSES

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.

FURNACES (Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co. Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

FURNACES (Crucible Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Electric Melting)

Ajax Electric Furnace Corp., 46 Richmond St., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Greene Electric Furnace Co., 2702 6th So., Seattle 4, Wash.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Induction Heating)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13 Ohio.
General Electric Co., Schenectady, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Surface Combustion Corp., Toledo 7, Ohio
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Surface Combustion Corp., Toledo 7, Ohio
Swindell-Dressler Corp., Pittsburgh, Pa.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.

FURNACE BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
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Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
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Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.
Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

STACKING BOXES

Palmer-Shile Co., 1600 Fullerton Ave., Detroit 27, Mich.

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American Bridge Co., Pittsburgh 19, Pa.

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Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

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Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS

Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.

TANKS (Dewatering)

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N.Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit 4, Mich.

TESTING LABORATORIES

Harry Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

—When writing advertisers, please mention THE FOUNDRY—

TESTING MACHINES (Tensile)

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit 4, Mich.

THERMOCOUPLES

Illinois Testing Laboratories Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

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TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

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Industrial Equipment Co., Minster, O.

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Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
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Schramm Inc., West Chester, Pa.

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Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

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Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

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TRUCKS (Casting)

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Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

TRUCKS (Power Lift)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., Libertyville, Ill.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUBES (X-Ray)

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

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Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
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Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

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VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
C. B. Hunt & Sons, Inc., Salem, Ohio.
Wm. H. Nichols Co., Richmond Mill, Long Island 18, N. Y.

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Norwalk Valve Co., S. Norwalk, Conn.

VALVES (Oxygen, Acetylene)

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Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

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Demmler & Bros., Wm., Kewanee, Ill.
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Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave. W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 13° Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

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Martin Engineering Co., Kewanee, Ill.

VISES (Air Operated)

Van Products Co., Erie, Pa.

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Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

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National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

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International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

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Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Company, Worcester 6, Mass.
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Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

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Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE BRUSHES

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Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE NAILS

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

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Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Oliver Machinery Co., Grand Rapids 2, Mich.

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Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.
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Classified Advertising

Foundries For Sale

FOR SALE OR LEASE

Small complete gray iron foundry. Room for expansion. Main foundry building 42' x 84'. Three buildings for pattern space 20' x 40'. Large bins for sand, coke and pig iron. Tracks from bins to charging rooms. Address: Box 866, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE—GRAY IRON FOUNDRY

Jobbing and production. 12,000 sq. ft. floor space. Well equipped molding, core, cleaning and pattern room. Central heating system. Now producing quality castings for the trade. Excellent clientele and reputation for good castings. Located centrally from Detroit, Lansing, Toledo. Real opportunity for capable and aggressive party. Require in excess of $50,000 to handle. Address: Box 870, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Small aluminum and brass foundry to be leased or sold. Good steady going business established. Sale transaction by owner due to death in family. Address: Box 813, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Brass and aluminum foundry. New brick building, 4000 sq. ft. All new modern equipment, located in large industrial area in Northern Illinois. Address: Box 810, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Small grey iron foundry, established business 42 years, located in the heart of the textile industry in the Carolinas. Only foundry in town of 35,000. 15 textile plants, including Celanese Corporation of America, Lowensteins large Printing and Finishing Company. 12,020 sq. ft. brick building, fair equipment. 36" cupola. Pig iron, coke and scrap on the yard. Owner selling because of illness. Wonderful opportunity for small setup. Address: Box 817, Rock Hill, South Carolina.

FOUNDRY FOR SALE

Small complete grey iron foundry ready to operate, capacity 5 or 6 tons good castings per day. Plenty experienced labor available. Located at Englewood, Tenn., in center of Tennessee Valley. Good opportunity for experienced man with small capital to go in business. Address: H. F. McMILLAN, P.O. BOX 26, ATHENS, TENNESSEE.

FOR SALE OR LEASE
WITH PURCHASE OPTION

Iron foundry, located in Bridgman, 10 miles south of St. Joseph, Mich. Here is an opportunity to acquire an exceptionally fine plant suitable for heavy grey iron castings, or production lines. Main building has two crane-covered floors 240 ft. long; steel, brick and concrete construction. Total floor area 50,000 sq. ft. Land—7½ acres inside steel fence. C.&O. R.R. sidings. Stoker-fired boiler serves unit heaters; exhaust fans in roof. This very unusual set-up would justify moving your foundry operations from congested city to small town affording good labor supply where living conditions are excellent. For information, address:

Mr. M. R. GAULT
HANNIFIN CORPORATION
1101 S. KILBOURN AVE. CHICAGO 24, ILL.

Capacity Wanted

IRON BARBELL PLATE CASTINGS

Foundry equipped to quote maximum 5c per pound on well cast and painted barbell plate castings for North Jersey concern. Hard or soft grey iron. Should be close enough to New York area to afford no more than 50c per 100 lbs. trucking rate. Address: Box 854, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

OPEN CAPACITY

Grey or malleable iron. We specialize in castings from a fraction of an ounce to a pound. Send samples. Address: Box 865, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Employment Service

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (40 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

For Sale

AIR RECEIVERS

Bargain two tanks 42" ID x 13'-0" shell ¾" plate welded and riveted 350# safe working pressure. $475.00 each fob. Address: PLANT EQUIPMENT COMPANY, CINCINNATI 3, OHIO.

FOR SALE

Continuous Despatch baking oven. Sectioned for loading and unloading, preheat, heating and cooling, 93'8" L, 13'W, 14' H. Link Belt conveyor; gas-fired externally, recirculating. All section have non-thru metal panels, rock wool insulated. Address: ARCOS CORPORATION, 1500 S. 50th STREET, PHILADELPHIA 43, PA., T. McGOVERN.

FOR SALE
FOUNDRY EQUIPMENT

A large Massachusetts manufacturing concern has discontinued its gray iron foundry operations to expand manufacturing facilities, therefore all of its foundry materials, equipment and machines are for sale. This material and equipment are in good operating condition and of the type generally used in floor, bench and machine molding, such as:

CARL-MAYER BATTERY OF FOUR (4) CORE OVENS EACH AUTOMATICALLY OIL FIRED.
AMERICAN SAND CUTTER, NO. 766 MODEL D SIZE 96/78.
AMERICAN SAND CUTTER, NO. 238 MODEL M SIZE 99/80.
LANCASTER COUNTER CURRENT RAPID BATCH MIXER — BUCKET LOADER — 15 HP, 550 VOLT 60 CYCLE 3 PHASE MOTOR.
GENERAL ELECTRIC CENTRIFUGAL CUPOLA BLOWER WITH 58 H.P. MOTOR, 550 V., 60 CYCLE, 3 PHASE, CAPACITY 7100 CFM AT 1.25 LB. PRESSURE, COMPLETE WITH CONTROLS.
TABOR MOLDING MACHINES OF VARIOUS TYPES, CHARGING CARS, STEEL FLASKS OF VARIOUS SIZES, ETC.

For full details of items you may be interested in or should you want to make a personal inspection at our plant—Write

BOX 767
THE FOUNDRY CLEVELAND 13, OHIO

For Sale

FOR SALE

1—Whiting Cupola #6-50 foot stack. Dismantled and in excellent condition.
1—Spencer Turbo Blower with 40 H.P. Motor.
1—Root Blower #7 with 75 H.P. Motor.
1—Lindberg Pit Type Tempering Furnace—Type 2828-EH Serial #1337.
1—American Wheelabrator Multi Tablast Model BM-66200, Serial #A50689.
1—Simpson Mullor Model O.
2—Tannewitz Bandsaws with 36" wheels and one with 42" wheel—excellent condition.
7—Double End Pedestal Grinders.
1—Royer Shakeout Machine.
12—Tabor Stationary Jar Top Squeezers.
4—Osborn Squeezers Model 276-J.
2—Tabor Portable Jar Flask Lift Moulding Machines—20" x 24" table.
1—Tabor Portable Shockless Jar Flask Lift Moulding Machine—32" x 32" table.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER MASSACHUSETTS

FOR SALE

1 only #406 Osborn stationary jolt rollover pattern draw molding machine—flask capacity, max. length overall 78"; width outside 50"; flask space, minimum 13", maximum 24"; jolt cylinder diameter 16"; pattern draw 18"; jolt capacity at 80 lbs.; air pressure 500 lbs.; misc. spare parts; and auxiliary equip. for feeding sand to this unit. For further information, write or call ELECTRIC STEEL FOUNDRY CO., PORTLAND, OREGON.

EQUIPMENT FOR SALE

MOLDING MACHINES
1—74J-W Osborn Jolt Squeeze Portable.
2—75J-W Osborn Jolt Squeeze Portable.
3—75J Osborn Jolt Squeeze Portable.
3—Federal RAPID Jolt Squeeze Portable.
2—SPO #611B Stationary, Oscillating, Jolt Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.

BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua rotary pressure blower, rated 19 cu. ft. per revolution.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.

METAL MELTING EQUIPMENT
1—Hausfeld 2000# aluminum capacity furnaces, barrel type, open flame, oil fired.
2—Monarch-Rockwell Rotating, 500# brass, oil.
1—Buckeye #150 Crucible tilting furnace, with Premix blower for gas fire.
New 32" to 41" Dia. shell Cupolas made to order.

TUMBLING MILLS AND SAND BLAST
3—36" dia. x 54" long reliable tumbling mills.
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
1—Pangborn type EN-2 sand blast cabinet, suction type, 5 x 3 x 7 high.

MISCELLANEOUS
5—Kock electrically heated ovens for baking cores, 4½ ft. wide, 6 ft. high, 6 ft. deep, complete with recirculating fan and controls.
1—Young Bros. tower core oven, 5 ft. x 1 ft. shelves, gas fired, complete with Foxboro control.
1—Young Bros. batch type recirculating hot air, gas fired, core oven, 5 ft. x 6 ft. door opening, 9 ft. deep.
3—Foundry Equipment Co. sliding shelf core ovens, with five 30 x 42" shelves, 8" high, gas fired.
1—Lampson Endless Mold Conveyor, 100 ft. long x 16 ft. wide, with 19 x 26" pallets, 36" on centers.
6—24" wide belt conveyors for sand, totalling approximately 500 ft. Individual units can be furnished any desired length.
17—Sand hoppers with foundry type bin gate.
1—Bucket sand elevator, 50 ft. tall, complete.
4—Heavy duty flexible shaft grinders 2 HP.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

Classified Advertising

For Sale

FOR SALE

WE HAVE CLOSED OUR GRAY IRON FOUNDRY AND HAVE THE FOLLOWING EQUIPMENT FOR SALE:

4 Type R94 Pioneer Molding Machines.

8 Model 104-5 Milwaukee Molding Machines.

1 Connersville Heavy Duty Horizontal Blower Complete with Pulleys, Safety, Switches and Controls.

1 Fairbanks Morse, 30 h.p. Induction Motor, 60 Cycle, 220 Volt, 3 Phase.

1 Modern Equipment Company #4 Foundry Cupola.

1 Portable Sand Cutter, 6' Long and 3' in Diameter Complete with Motor, Controls and Safety Switches.

1 Hauck Manufacturing Company Gas Fired Ladle.

6 Modern Equipment Company, 150 lb. Ladles Complete.

3 Modern Equipment Company, 600 lb. Ladles Complete.

1 F & H, 1 Ton, Electric Lift with Cable and Motor.

1 20 h.p. Louis Allis 1740 R.P.M. Motor.

3 Louis Allis, 1 h.p. 1140 R.P.M. Motors.

1 Beardsley & Piper Company Model S Screenarator.

1 International Molding Machine, Model 3711—14X8R.

1 American Air Filter, 36" x 36" x 24" High Steel Dust Collector Complete.

1 Delco 7½ h.p. 1160 R.P.M. Motor.

1 Modern Equipment Cupola Charging Unit with 30" Capacity Steel Bucket Guildes, Cable, Motors, Controls, Complete.

Aluminum Alloy Flasks, Hardwood Flasks and Many Other Pieces of Foundry Equipment. This equipment will be sold first come—first served. Make us an offer!

PICK MANUFACTURING COMPANY
WEST BEND WISCONSIN

FOR SALE
NUMBER 3 SIMPSON #2200 MIXER

Including reducer, #3 Aerator, #3 loader skip hoist, 20" wide belt conveyor, one box car loader, one 40 HP motor and starter, one #5 H.P. motor for loader, one #5 H.P. motor starter for Aerator, one #3 H.P. motor and starter for conveyor. Details furnished on inquiry to

PORTER WARNER INDUSTRIES, INC.
334-9 VOLUNTEER STATE LIFE BLDG.
CHATTANOOGA, TENNESSEE

MOLDING MACHINES FOR SALE

6 International Barrel Type Core Rollover Machines—fast electric and air controls—opening 30" length—25" high—8" draw—25" width. These machines can be used on either side of core blowers. A real buy at $900.00 each.

6 International Air Jarring Machines—5" diameter jolt cylinder—27" x 24½" table with roll offs. Excellent for core room work, at $150.00 each.

2 Herman Jar Rollover 24" x 30", 1000 pound Pattern Draw Machines. $450.00 each.

1 Degreaser—Detrex Model VS800 #10101—36" x 60" x 70" tank with fittings. $250.00.

3 Flexible Shaft Grinders—Kellerflex Bench Type SC—1/3 H.P. 1725 R.P.M.—60 cycle—3 P.H. 440 volts—can be converted. Practically new. $100.00 each.

All above equipment in first class working condition.

F.O.B. OUR PLANT
STANDARD PATTERN WORKS—
MACHINE DIVISION
6771 E. McNICHOLS ROAD
DETROIT 12, MICHIGAN

For Sale

FOR SALE
FOUNDRY EQUIPMENT

2—#2 Multi-Table TABLAST — PRICED TO SELL.
1—Pangborn ROTO-BLAST, Horizontal Spindles —NEW, NEVER INSTALLED.
1—Pangborn Hand Sandblast Cabinet, complete with Dust Collector—Excellent Condition.
1—BVR-7 Pangborn Abrasive Separator.
1—#333 Osborn Jolt Squeeze Roll-Over Molding Machine—Like New—CHEAP.
1—15 H.P. U. S. Swing Frame Grinder complete, 24" x 3" Wheel—Used Very Little.

Location: Our Cincinnati Warehouse
PHONE: Mr. Don Whitehead
PRINCETON 8405 (Glendale, Ohio)

L. J. LAND, INC.
146 GRAND STREET
NEW YORK 13, N. Y.
CANAL 6-6976

FOR SALE

McLain's System course Steel Foundry Practice, pamphlet form without correspondence feature for $25, never sold for less than $75. Closing out edition.

McLAIN's SYSTEM INC.
236 E. NORTH AVE. MILWAUKEE 12, WIS.

FOR SALE

Have you read the advertisement in the Engineering Service column of this issue regarding Sashweights? Refer to:

BOX 853
THE FOUNDRY CLEVELAND 13, OHIO

USED FOUNDRY EQUIPMENT

1 only #275J Osborn Moulding Machine	$195.00
1 only #275J Osborn Moulding Machine	70.00
1 only #4DG Swartwout Core Oven Gas fired portable type with thermostatic control	175.00
1 only #400 Hausfield Gear Tilt Crucible Furnace silicon carbide lining with insulation complete with S262 burner nozzle with 1⅝" orifice for gas fuel and Crucible rest block	225.00
1 only #7 Hausfield Blower with 1 H.P. motor 110V 60 cycle single phase	90.00

F. O. SCHOEDINGER
322 MT. VERNON AVE. COLUMBUS 3, OHIO

FOR SALE

1 only 1500 lb. melting capacity Greene electric arc furnace, 3 phase—where is, as is—complete up to the transformers. This furnace was built in August, 1930 and was modernized with the installation of modern controls in 1940. For further information, write or call: ELECTRIC STEEL FOUNDRY CO., PORTLAND, OREGON.

EQUIPMENT FOR SALE
PANGBORN SHOT BLAST ROOM

New—never installed. Size 12' x 25' with two blast chambers, complete with new Pangborn Dust Collector, 60 cycle A. C. motors.

BEARDSLEY & PIPER SANDSLINGER

Motive Jr. track traveling type; had very limited use—excellent conditions.

BEARDSLEY & PIPER SAND CONDITIONER

In fine condition—used about one year. Magnetic pulley.

No. 1 SIMPSON SAND MULLERS

2—machines available—one is practically new. Other equipment: Complete Laboratory; American Sand Cutter; American Dustube Collector; Mold Wash Mixer. For information, address:

MR. M. R. GAULT
HANNIFIN CORPORATION
1101 S. KILBOURN AVE., CHICAGO 24, ILL.
TELEPHONE NEVADA 8-0406

FOR SALE

Two Herman rollover molding machines in excellent condition. Size 40 x 58" 3740 pounds rollover capacity suitable for foundry equipped with sandslinger. Offered at bargain price. Address: Box 861, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440 3/60		3600
1050	32 oz.	Spencer	15	550	3500
900	24	Spencer	15	220/440	1800
225	10	Spencer	1	220/440	3600
PRESSURE BLOWERS (3 Phase, 60 Cycle)					
2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1300	16 oz.	Nth. Amer.	10	440	1800
1150	20 oz.	Nth. Amer.	10	220/440	3600
950	16 oz.	Nth. Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth. Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO
FOR SALE

FOR SALE

A reasonable offer will get you a modern sand handling system consisting of 19 individual moulders' hoppers, two 25-ton sand storage bins, one #50 Beardsley & Piper speed muller with 40 HP Motor, magnetic separator with bucket elevator, overhead monorail system and cab controlled electric hoist and monotractor and shell buckets with automatic trips for delivering sand from speed muller to moulders' hoppers.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER MASSACHUSETTS

FOR SALE

DUST COLLECTOR. American Air Filter type W roto clone, arrangement D. Wet system. Capacity 6000 CFM. Equipped with stainless steel impeller blades. Only slightly used. Excellent condition. Price quoted, without motor or electrical controls on request. Address: UNIVERSAL FRICTION MATERIALS COMPANY, 303 WEST RUSH STREET, KENDALLVILLE, INDIANA.

FOR SALE

Complete sand handling and mold conveying system for 19 molders. Equipment includes:

2—#70 speed mullers
100 ton sand storage hopper
1—#648 Simplicity shakeout
150 ft. plate belt shakeout conveyer

94 ft. in two lines of roller conveyer for each station and all other equipment for a grey iron mechanized shop.
All this equipment new in 1948 and used only 9 months.

BOX 856
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

The following three (3) phase Arc Furnace equipment: one (1) G.E. 400 Amp. 15000 Volt, Oil Circuit Breaker; one (1) Westinghouse Balance Beam Current Regulator Panel; one (1) Westinghouse Control Panel; one (1) 350 KVA, Pittsburgh, Transformer Regulator Panel. Address: Box 830, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE
ELECTRIC MELTING FURNACE

TOP CHARGE 9 FT. DIAM. SHELL, WITH 2500 KVA TRANSFORMER. VERY LITTLE USED, IN GOOD CONDITION.

FRANK B. FOSTER, INC.
2217 OLIVER BLDG. PITTSBURGH 22, PA.

Classified Advertising

For Sale

FOR SALE

2 Spencer Turbo compressors in A-1 Condition, both for $1,000.00 f.o.b.
Specifications are:
30 H.P. motor 220-440 volts 3 ph.
1800 R.P.M.
No. 3 bottom Horizontal discharge
16" blast gate 15" intake
9621 Cutler Hammer starter
4300 C.F.M. 16 oz. pressure

BOX 849
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—Rebuilt American Sand Cutter, Model AA, 72" overall width with 61" wide cutting cylinder.
1—New International Type SB13 Core Blower with SB762 sand container, equipped complete with rollers in the table, core box locking valve and vibratorially agitated sand hopper.
2—New International Type JL Jolt Ram Air Cylinder Post Lift Molding Machines, size 10# cylinder, 30" x 42" table.
1—New International Jolt Roll Over Molding Machine 20 x 8", Type HDG, Serial 58041-2.
These machines can be inspected at our plant.

THE EASTERN FOUNDRY COMPANY
BOYERTOWN, PA.

FOR SALE

Two International pin lift molding machines, type JDT, serial number 54754-6, size 1600 x 10, 36" table. In good condition. Address: Box 771, The FOUNDRY, Cleveland 13, Ohio.

For Sale

REBUILT EQUIPMENT

20—Osborne Jolt Squeezers, Type 275J
4—International R.O. 20 x 8, Type G
2—International R.O. 24 x 10, Type G
1—Herman R.O., 1500 Series

1—Simpson #2 Mixer, Motor Drive, with Loader and Dust Hood—late model
1—27" x 36" American Wheelabrator
1—Model "S" B. & P. Screenarator
2—Royer Sand Aerators

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
707 MILWAUKEE AVE., CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

Cupola, 30" O.D. Whiting style. Compressor, Ingersoll-Rand complete with 25 h.p. motor. 115 c.f.m. Complete with tank and switches. Tumbling barrels. Large, gear drive with clutches and exhauster. Patterns for cast iron kitchen ranges, various sized kitchen oil burners, side arms and water heaters. Patterns for large cast iron soil pipe rattler. Large supply of foundry patterns and equipment too numerous to mention. Write for what you need. . . we may have it. Address: Box 852, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

2,000 lb. capacity iron melting Sklenar gas fired furnace. Practically new.

HALEY-WARREN, INC.
1450 HOWELL MILL ROAD, N. W.
ATLANTA, GA.

For Sale

FOR SALE

Several 42" dia. x 72" type "C" Sly tumbling mills. Direct and V-belt drives with or without motors.

NEW HAVEN FOUNDRY
NEW HAVEN, MICHIGAN

FOR SALE

Multiple-pass vertical core oven, 24' x 16½' x 11½', gas fired, cross bar conveyor, cooling zone, Leeds & Northrup controls, rack size 31" x 14" x 25". Excellent condition. Cost $30,000—our price $4,500.

Fresh air supply system, 40,000 CFM, with 154 sq. ft. oil filter system, gas fired, 15 HP blower. A.1 electrical controls. Cost $16,000—our price $3000.

Gardner-Denver vertical air compressor with aftercooler and 40 HP 220/440 volt motor and starter. Our price $750.

BOX 860
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

36 x 42 American Tumblast Wheelabrator
Good condition—A Real Buy!
#3C Demmler Core Blower
918 Johnston & Jennings Molding Machine
International JDP Molding Machines (2) 20 x 22 table
Royer and Simplicity Screenerators

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1186

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 12.00	$11.00	$10.00	$ 9.00
2 inches	21.75	20.00	18.25	16.75
3 inches	32.00	29.25	26.75	24.00
4 inches	40.00	36.75	33.25	30.00
5 inches, ½ col.	48.00	44.00	40.00	36.00
6 inches	58.75	53.25	48.00	42.75
7 inches	66.00	60.00	54.00	48.00
8 inches	73.25	66.75	60.00	53.25
10 inches, 1 col..	88.00	80.00	72.00	64.00
Half Page	130.00	120.00	110.00	100.00
Full Page	220.00	200.00	180.00	160.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

THE FOUNDRY

Penton Building, Cleveland 13, Ohio

It's EASY to install "Payroll Savings"

If you've put off installing the Payroll Savings Plan in your company because you feel it would be "a lot of work," then this advertisement is certainly for you! Because it's really *very simple* to give your employees the advantages of investing in U. S. Savings Bonds the easy, automatic "Payroll" way.

. . . and 20,000 companies' experience proves it pays!

HERE'S ALL YOU NEED TO DO

Appoint one of your top executives as Savings Bond Officer. Tell him to get in touch with your State Director, Savings Bonds Division, U. S. Treasury Department. Here's what happens . . .

The State Director will provide application cards for your employees to sign—plus as much promotional material and personal help as necessary to get the Plan rolling in your company.

Those employees who want Savings Bonds indicate on the applications: how much to save from their pay; what denomination of Bonds they want; and the inscription information to appear on the Bonds.

Your payroll department arranges to withhold the specified amounts, arranges to get the Bonds, and delivers them to the employees with their pay.

The Bonds may be obtained from almost any local bank or from the Federal Reserve Bank or may be issued by the company itself upon proper certification by the Federal Reserve Bank or Branch in the company's District.

THAT'S ALL THERE IS TO IT!

In case you're skeptical as to how many of your employees would like to have Payroll Savings, canvass your plant—and be prepared for a surprise. (Remember that pay-check withholdings for Bonds are *not* a "deduction"—the employee takes home his Bonds with his pay.) One leading manufacturer, who had professed little faith in the Plan, found his eyes opened when he asked the people in his plant whether they would like to obtain Bonds in this way. Within only six months after he installed the Plan, half his employees signed up. A prominent aircraft manufacturer, whose company had used the Plan for some time, was not aware of its potentialities until his personal sponsorship increased participation by 500% among his company's employees.

THE BENEFITS ARE BIG— FOR EVERYONE

The individual employees gain security—they know that the Bonds they hold will return $4 for every $3 at maturity. The company gains from the resultant increased stability and efficiency of its workers. The whole nation gains because Bond sales help stabilize our economy by spreading the national debt and by creating a huge backlog of purchasing power to boost business in the years ahead.

Is it *good policy* to deprive your company of Payroll Savings—even one more pay day? Better at least have a talk with your U. S. Savings Bonds State Director, get the answers to your questions, and *know for sure.*

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

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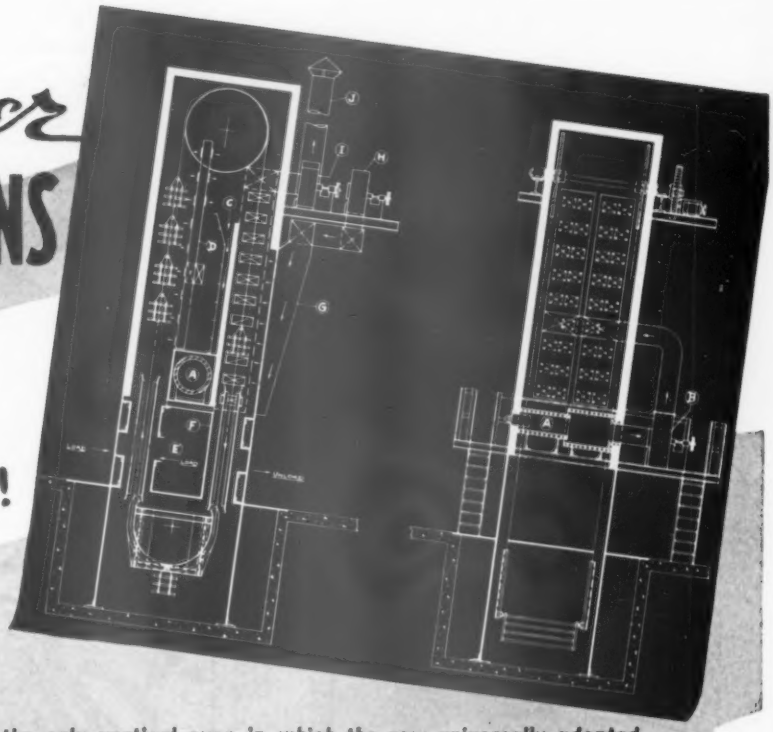
Carl-Mayer VERTICAL CORE OVENS

PATENT NO. 2,257,180

THE MOST MODERN, FINEST, MOST EFFICIENT VERTICAL OVENS BUILT!



This is the only vertical oven in which the new universally adopted recirculating heating system, with completely sealed combustion chamber, may be located between the conveyor chains. Patent No. 2, 257, 180.

3 Outstanding Carl Mayer Vertical Ovens at General Steel Castings Corp. Each oven 67' high, 80 tons per bake, per oven.

Typical Users of CARL-MAYER VERTICAL OVENS

Aluminum Co. of America
Burt Foundry Co.
Cadillac Motor Co.
Eclipse Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Motors Corp.
General Steel Castings Co.
Harrison Radiator Co.
Henry Kaiser
H. B. Salter Co.
McKinnon Industries
Quality Castings Co.
Packard Motor Co.
Richmond Radiator Co.
Union Brass and Metals Mfg. Co.
West Michigan Steel Castings Co.

Many Reasons for CARL-MAYER Superiority:

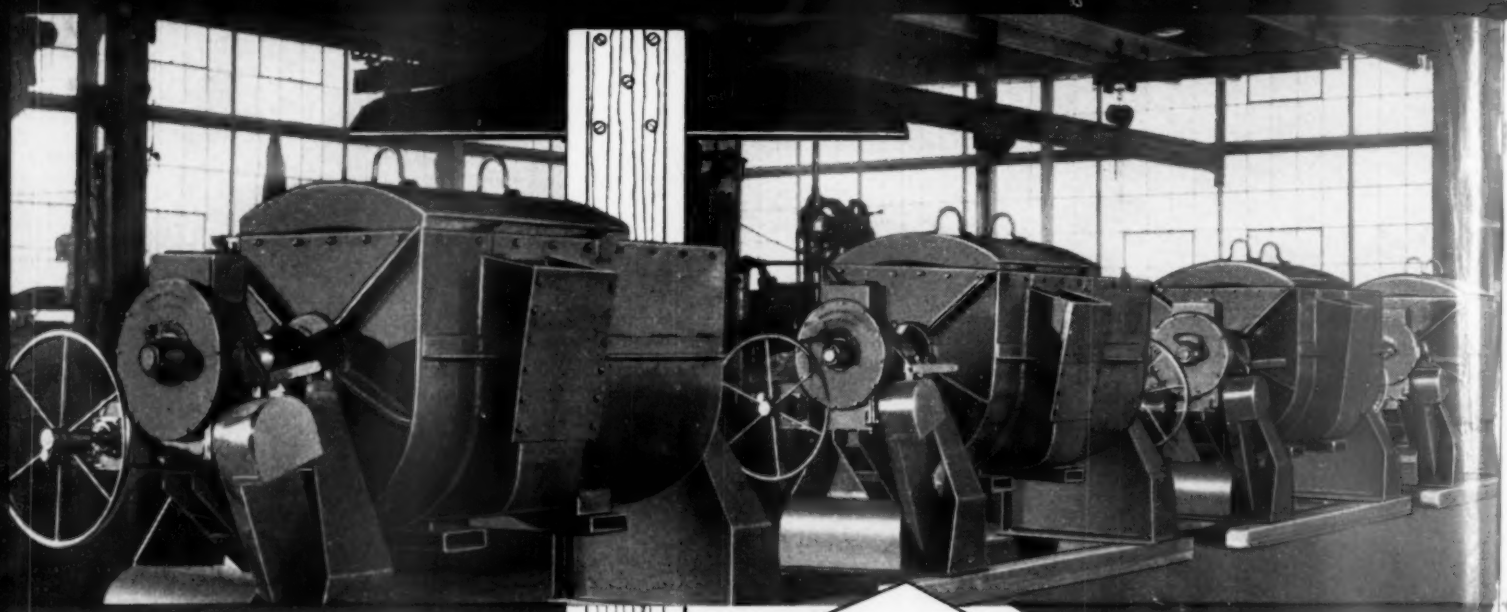
Because of the following features in the Carl-Mayer Vertical Core Oven, outstanding results are guaranteed—FASTER BAKING, LOWER FUEL CONSUMPTION, SMALLER CORE LOSSES, SAFER OPERATION, ELIMINATION OF SMOKE, COOLED CORES AT UNLOADING STATION, REDUCED LABOR COSTS.

- The completely sealed combustion chamber (A) prevents hot combustion gases (1,200° or over) from going directly into the oven chamber, *preventing non-uniform temperatures and burned cores.*
- The combustion chamber (A) located between conveyor strands, *saves space* as compared with vertical oven designs locating the heater external to the oven.
- The external heat fan (B) takes the heated air from the combustion chamber and after tempering with fresh and recirculated air from duct (C) delivers it to the vertical plenum chamber (D). Result: *fast, uniform circulation of heated air—faster baking.*
- Plenum chamber (D) is arranged to insure uniform cross flow of heated air over each passing carrier shelf, resulting in uniform flow of heated air across cores. Result: *uniform fast baking.*
- The "Thru-Passage" (E) properly designed is an old practice used in ceramic drying, and has long proved its efficiency in similar drying procedures. *Permits loading from inside as well as outside.*
- Arrangement of "Thru-Passage" designed by Carl-Mayer (patents applied for) with partition (F) facilitates loading from both inside and outside of oven *but* limits the *unloading* to one side. This is a proven forward step, permitting adequate and fast unloading without the temptation to unload from the inside as well, with its resultant interference with loaders and danger of damaged cores.
- Cooling duct (G) and cooling fan (H) designed according to oven height and loading conditions, assure a uniform flow of cooling air across the cores on the down side to obtain *maximum cooling.*
- Cooling exhaust system, with cooling exhaust fan (I) and collector ducts, *assures prompt and safe removal of combined cooling and exhaust products and smoke from the baked cores.*
- Inspirator type oven exhaust stack (J) utilizes the spent work of the cooling exhaust fan to further remove fumes and to *prevent pocketing of any explosive gases.*

CORE OVENS, MOLD OVENS -- *all types*

THE CARL-MAYER CORPORATION
3030 Euclid Ave., CLEVELAND, OHIO

Backed by Over 30 Years' Experience



A *MODERN* 30,000 lb. capacity, 88" top diameter, geared, tapered, bottom-pour ladle.

A shipment of *MODERN* 8000 lb. capacity U-shape motorized mixing ladles ready for shipment to well-known automotive plant.

A *MODERN* 200 lb. capacity, 13" top diameter, covered, tapered ladle. It has roller bearing trunnions, No. 1 type tilting-shank and detachable bale.

Engineering Ability and MANUFACTURING FACILITIES for the PRODUCTION of LARGE or SMALL FOUNDRY EQUIPMENT

Four *MODERN* No. 9 Cupola Body Sections, designed for hot-blast; loaded on railway car for shipment to a large automotive foundry.

MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

Ask the Modern Sales Engineer in your area for engineering counsel and complete information on MODERN Cupolas, Cupola Chargers, Ladles, Pouring Devices and Hot Metal Handling Systems . . . or Write for Consolidated Catalog.

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES

5 IMPORTANT FEATURES HELP

GOOD ADHESION

PROPER SUSPENSION

CORRECT PENETRATION

UNIFORM COVERAGE

HEAT RESISTANCE

Stevens "Balanced" CORE and MOLD COATINGS

Cut Casting Cost

WHERE IT COUNTS THE MOST

Cutting Costs "counts the most" where it's possible to minimize scrap and casting repair, as well as eliminate excess blasting, chipping or grinding. That's the dedicated purpose of every Stevens *quality-controlled* core and mold coating.

When you see a clean, smooth casting shaken out of a mold requiring but a minimum of tumbling, brushing or blasting to finish and see it happen not once, but hundreds or thousands of times as the case may be . . . you can bet your bottom dollar it's only because some cost-conscious foundryman left no stone unturned to find a better core and mold coating for that job.

We'd like to think that that foundry operator is a Stevens customer and friend . . . for it has been our privilege and pleasure to serve such men for more than half a century. During that time we've developed innumerable "job-proved" coatings, any one of which might answer *your* specific needs . . . whether you're pouring gray iron, brass, bronze, aluminum, steel or magnesium.

It will pay you to get a true estimate—not a guesstimate of the core and mold coating best qualified to answer your particular purpose.

We could go on *talking* good coatings and build a story around the laboratory and production control which guarantees the consistent uniformity of every Stevens coating whether it be of a graphitic, carbonaceous or refractory nature, but we'd rather *show* you on your job just what a "qualified" coating can mean in terms of production savings for you and your company. That's the *only* evidence we ask you to believe. Let us prove our point in your behalf. We'll let results speak for themselves.

SINCE 1882 — FREDERIC B. STEVENS INCORPORATED — EVERYTHING FOR A FOUNDRY — DETROIT 16, MICHIGAN

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY EQUIPMENT AND SUPPLIES

FREDERIC B. Stevens INCORPORATED

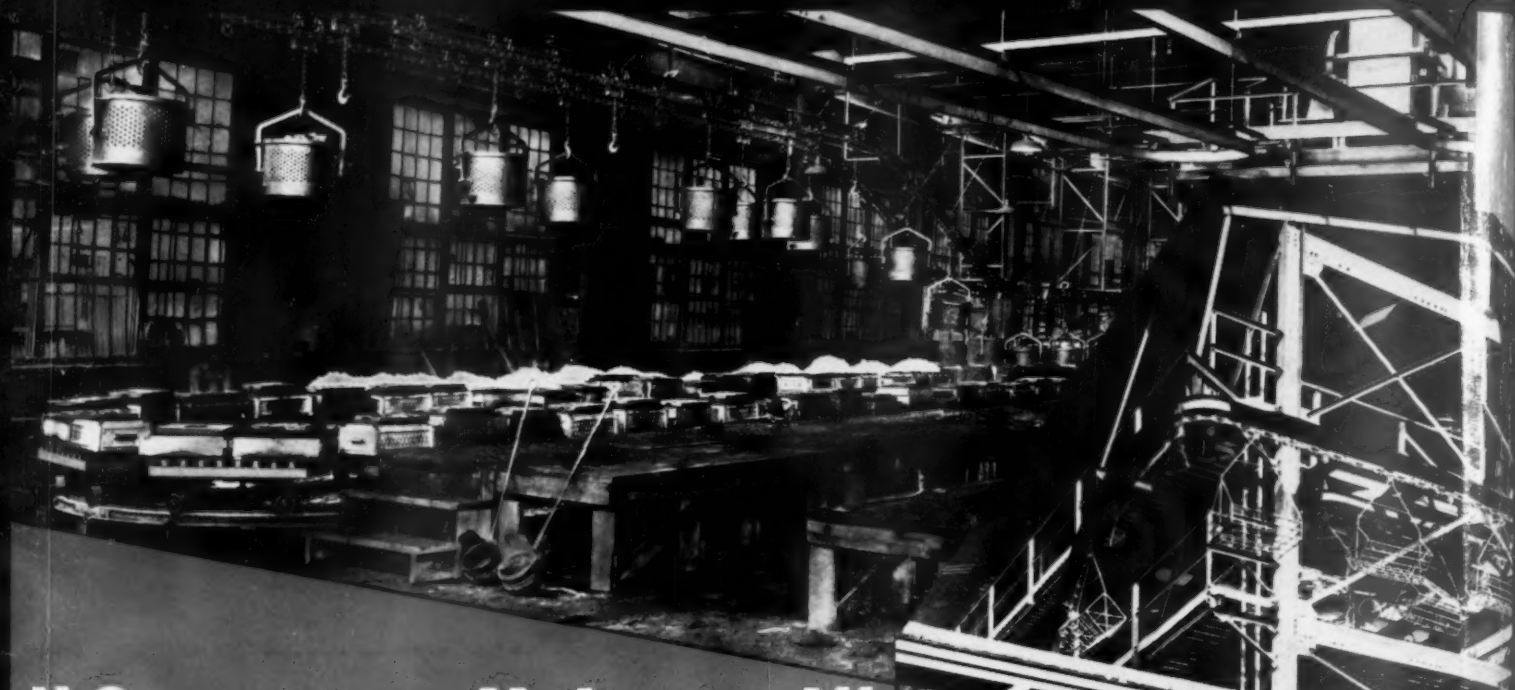
DETROIT 16, MICHIGAN

Branches • Sales Offices • BUFFALO • NEW HAVEN • INDIANAPOLIS • CLEVELAND

Representatives in Principal Cities

FREDERIC B. STEVENS OF CANADA, LTD. WINDSOR, TORONTO, ONTARIO

FOUNDRY EQUIPMENT AND SUPPLIES DIVISION



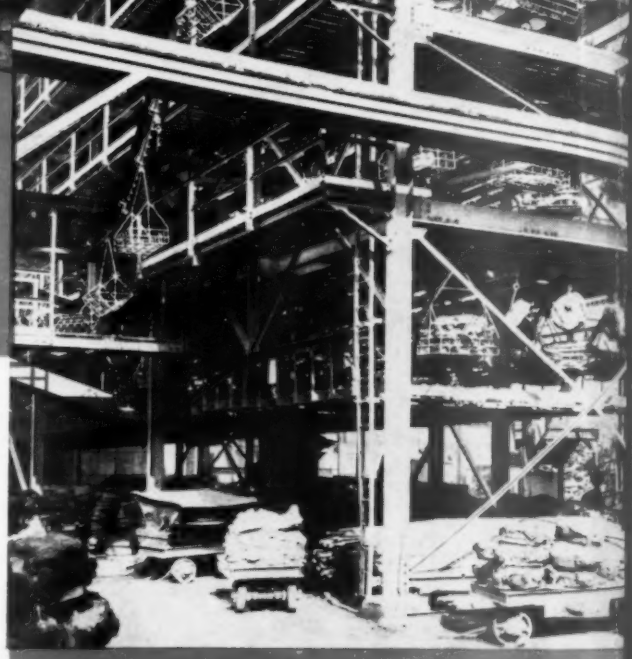
"Operation Unlimited"

LINK-BELT Overhead Conveyors for foundry mass production

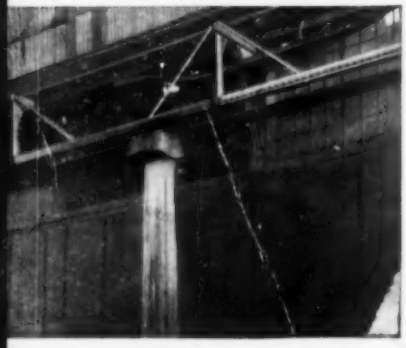
Castings being handled through cooling cycles to cleaning rooms —sprue being dumped automatically at discharge station and finished cores being transported to foundry operations.

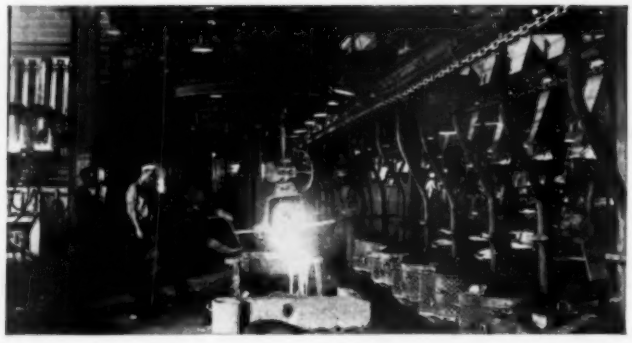
The possibilities of Link-Belt overhead conveyors in expediting mass production, cutting costs and making the foundry a better place for labor, are unlimited. Floor space is made available for production because trolley conveyors are supported from overhead and give double use of ceiling or roof trusses. They can travel irregular paths at predetermined speeds to meet production requirements. They are simple, rugged, inexpensive and easily installed around existing equipment. Path readily altered. Require little power to operate with practically no maintenance.

Let our experienced foundry engineers help you in applying trolley conveyor systems; also sand preparation and sand, mold, core and castings handling units to meet your requirements.



Top picture: Castings from shakeout stations handled in perforated buckets suspended from trolley conveyor. Above right: cooling tower with overhead conveyor handling individual castings. Below: pictures left to right show overhead trolley conveyors handling and automatically discharging sprue in charge make-up area, mold conveyor and core transport and storage conveyor, respectively.





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